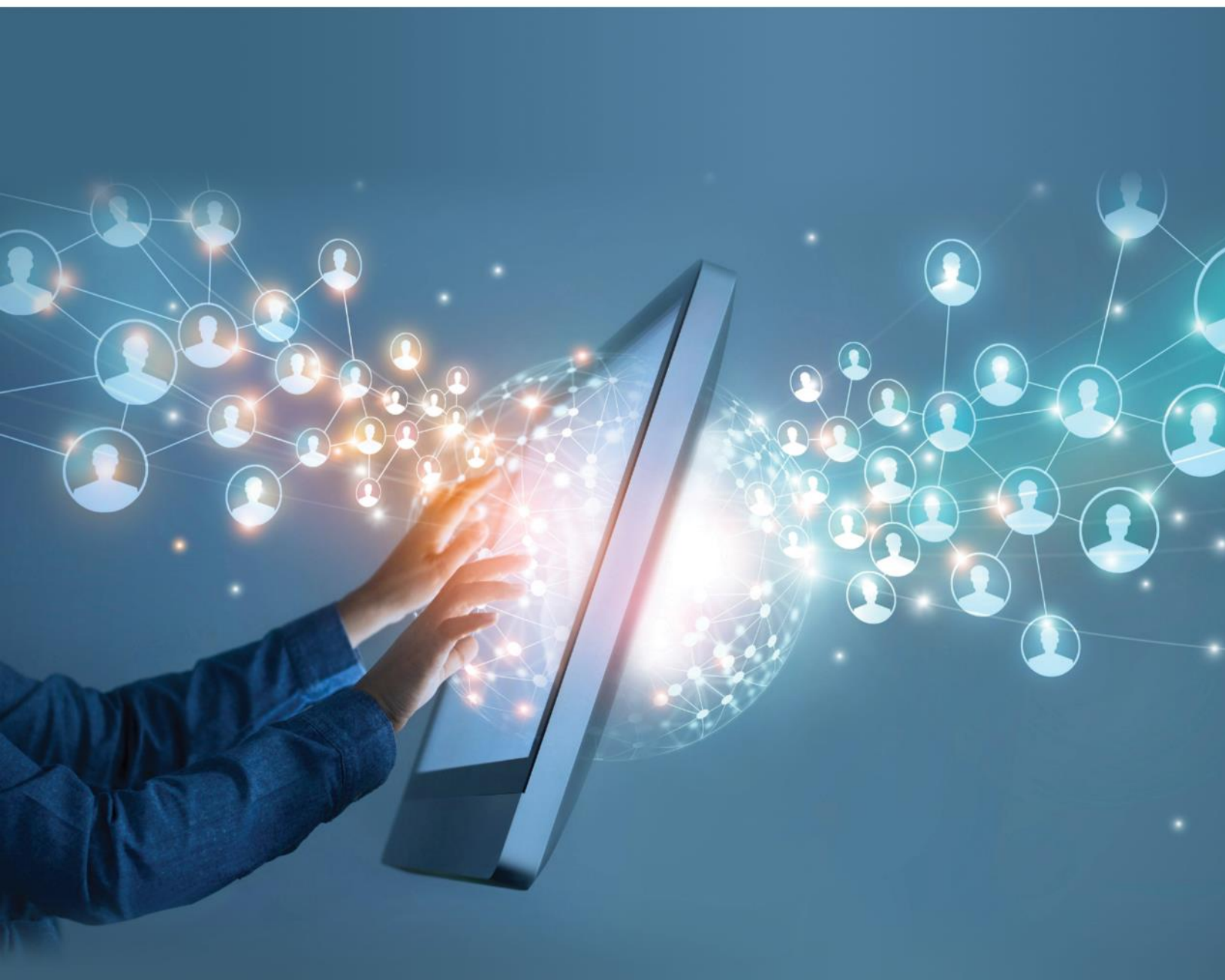


XCHANGE ABSTRACT BOOK



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Keynote Speaker:

Tuesday, June 8 – XChange in Australia, Asia and New Zealand

Dr. Shifalika Goenka will be presenting on:

Physical Activity Insecurity



Dr. Shifalika Goenka, Professor, Public Health Foundation of India leads the Physical Activity program at the Centre for Chronic Disease Control (CCDC) – a WHO Collaborating Centre for Surveillance Capacity Building, & Translational Research in Cardio-metabolic diseases. She has lead health promotion component(physical activity, nutrition, tobacco control) of the one of the largest worksite projects in multiple sites across India for prevention of Non- communicable diseases and obesity. She has worked in physical activity and health promotion including nutrition and tobacco in a variety of settings – community, school and primary health care setting. She strongly believes that the built environment, land use, the media, food pricing, urban design, social desirability & related policies have a huge impact on population behaviour.

Keynote Speaker:

Wednesday, June 9 – XChange in Europe and Africa

Dr. Meera Shekar will be presenting on:

Nutrition and Food System Transformation



Meera Shekar is Global Lead for nutrition with the World Bank and Program Manager for the Power of Nutrition TF. She has led the repositioning of the nutrition agenda that led to the new global Scaling-up Nutrition (SUN) initiative, and was a key thought leader on the Catalytic Financing Facility for Nutrition that evolved in to the Power of Nutrition. Meera serves as the elected chair for the SUN executive committee and has been one of the principals for the aid-architecture for nutrition, and the G8 and G20 agenda-setting process for food security and nutrition over the last several years. She leads the costing and financing analyses, the first ever global **Investment Framework for Nutrition** and is the author of the World Bank's first analytics on the **Health and Economic consequences of obesity**. She has also worked on the demographic dividend and population and development

issues.

Meera has lived and worked across the globe and has extensive policy and operational experience in Asia, Africa, Latin America. Before joining the World Bank in 2003, she led UNICEF's Health, Nutrition and Water Sanitation and ECD teams in Tanzania, the Philippines and Ethiopia. Meera has a PhD in international nutrition, epidemiology and population studies from Cornell University and is a **Commissioner on the Lancet Commission on Obesity** co-led by the University of Auckland & GW University; co-author of the 2008 Lancet Undernutrition Series; Member of the **Expert Advisory Group for UNICEF's State of the World's Children** report; Member External advisory board at DNS (2012-18), **Cornell University**; Adjunct Professor **Tufts University** (2012-15); She is an Advisory panel member for **Essential Living Standards index**, Legatum Institute, UK; and a member of advisory group at the **Cost of Obesity Group (CoAG)**, **Gates Ventures (Exemplars in Global Health)** and several others. She has authored several publications.

Keynote Speaker:

Thursday, June 10 – XChange in North and South Americas

Dr. Emily Mendenhall will be presenting on:

Syndemics: A Five Study Search of Synergies among Trauma, Hunger, Distress, and Diabetes



Emily Mendenhall, PhD, MPH is a medical anthropologist and Professor at the Edmund A. Walsh School of Foreign Service at Georgetown University. She has published widely at the boundaries of anthropology, psychology, medicine, and public health and is the inaugural co-editor-in-chief of Social Science and Medicine Mental Health. Dr. Mendenhall led a Series of articles in on Syndemics in The Lancet; and she has published several books, including Rethinking Diabetes: Entanglements with Trauma, Poverty, and HIV (2019), Syndemic Suffering: Social Distress, Depression, and Diabetes among Mexican Immigrant Women (2012), and Global Mental Health: Anthropological Perspectives (2015). In 2017, Dr. Mendenhall was awarded the George Foster Award for Practicing Medical Anthropology by the Society for Medical Anthropology. Her newest work, Unmasked, is a cultural and political commentary on how a small Iowan town responded to the global crisis of the COVID-19 pandemic; it is forthcoming in fall 2021.

**O1.01 - Walking and cycling in urban and rural environments,
June 8, 2021**

Social participation in urban environments: The role of physically active mobility and the perception of environmental features

Mr Lukas Bollenbach¹, Dr. Christina Niermann¹, Prof. Dr. Martina Kanning¹

¹University of Konstanz, Konstanz, Germany

Special Interest Group: H. Policies and environments (SIG)

Purpose: Living in urban environments is associated with higher levels of loneliness and inactivity, which are detrimental to mental and physical health. Therefore, it is necessary to identify factors that counteract these health decreasing characteristics. In this regard, there is convincing evidence that social participation, such as pursuing social activities, is related to better mental health. However, studies addressing factors that predict social activities in urban environments are lacking, especially as existing studies mostly focus on older age populations. Hence, this study aims to examine the simultaneous impact of residential environment features (REF) and physically active mobility (PAM) on social activities in mid-aged adults living in an urban area.

Methods: Cross-sectional data regarding PAM (walking to work, running errands by foot, bicycling to work, general bicycling, and strolling), social activities (i.e. frequencies or pursuing social activities, e.g., meeting friends/family, going to a bar/restaurant, etc.), REF (shortened NEWS-I, i.e., satisfaction with the living environment, e.g., available amenities, etc.), and Multidimensional Mood State Questionnaire (MDMQ) were collected from adults in several preselected residential areas in Stuttgart, Germany via an online questionnaire. JASP was used for a regression analysis to predict social activities from REF and PAM, and mental health from social activities.

Results: Data of 246 individuals (47% female, Mage = 46.19, SDage = 16.42) were included in the analysis. Satisfaction with REF [$b = 3.28$, $t(209) = 3.11$, $p = .002$] and PAM [$b = 3.03$, $t(209) = 2.95$, $p = .003$] both positively and significantly predicted social activities, ($F(2,209) = 10.981$, $p < .001$) accounting for 8.6% of the explained variability. In addition, social activities positively predicted mental health [$b = 0.09$, $t(222) = 2.22$, $p = .027$], ($F(1,222) = 4.942$, $p = .027$, $R^2 = .017$).

Conclusions: Results indicate that pursuing social activities is associated with the perception of physical environmental features of the living area and the amount of walking / bicycling in the residential environment. Gaining knowledge about the dependencies of social activities and mental health help to create health-enhancing urban areas.

Walkability in Rural Communities: Citizen science highlights connectivity as key to active living

Dr. Kim Jose¹, Mr. Oliver Stanesby¹, Ms. Kate Garvey³, Dr. Siobhan Harpur³, Dr. Lynden Leppard², Mr. Dion Lester, Prof. Andrew Palmer¹, Associate Professor Verity Cleland¹

¹Menzies Institute for Medical Research, University of Tasmania, Hobart, Australia, ²Local Government Association of Tasmania, Hobart, Australia, ³Public Health Services, Department of Health, Hobart, Australia

Special Interest Group: H. Policies and environments (SIG)

Purpose: People living in 'walkable' areas are more physically active, but current approaches to assessing and improving walkability focus on those who live in urban environments. Informed by systems approaches to understanding environmental influences on active living in rural communities this participatory research project asked citizen scientists to identify and explore the characteristics of their town that influence walkability and active living.

Methods: Adopting a citizen science approach, citizen scientists (i.e., local community members) in three rural towns conducted an active living audit of their town using modified Rural Active Living Assessment Tools (RALA) and taking photos of town features. The RALA tool includes; i) a town-wide assessment, ii) program and policy assessment and, iii) street segment assessments. Audit and photo data were collated before researchers facilitated workshops in each town to enable further sense-making with community members. Data from the RALA tools were scored and synthesised with data from photos and workshops before undergoing thematic analysis.

Results: Three rural Australian towns (population 300; 850; 2,890 respectively) were involved in the study with a total of 10 citizen scientists completing audits and 11 community members attending workshops. The town-wide assessment scores that reflect amenities and physical features varied (26-74%) while programs and policies scores were consistently low (21-26%). The two smaller towns were bisected by a main highway creating safety concerns relating to traffic and only the larger town had regular physical activity programs available to the community. In all towns the condition of and/or lack of footpaths, lack of road shoulders, traffic speed and inadequate signage were identified as barriers to walkability. However, improved connectivity between existing town features and trails was identified as the highest priority for enhancing walkability and as a mechanism for enhancing social cohesion.

Conclusions: The audit tools were useful in providing an overview of the rural towns involved, but the workshops were critical for sense-making and enhanced understanding of priority concerns for each town. The citizen science approach supported data collection and exhibited the potential to empower citizens to use the data to support local advocacy efforts to improve connectivity.

Associations of park use and physical activity in parks with wellbeing in an Asian urban environment: A cross-sectional study

Dr. Nick Petrunoff¹, Associate Professor Falk Müller-Riemenschneider^{1,5}, Ng Xian Yi¹, Borame Dickens¹, Angelia Sia², Joel Koo¹, Alex R. Cook¹, Wee Hwee Lin¹, Lu Ying³, Ann W. Hsing^{3,4}, Rob. M van Dam¹

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Special Interest Group: H. Policies and environments (SIG)

Purpose. Relationships between park access, park use, and wellbeing remain poorly understood, especially in Asian metropolitan areas. The objectives of this study were to investigate: (1) perceived and objective park access in relation to park use and physical activity in parks; and; (2) perceived and objective park access, park use and physical activity in parks and their associations with wellbeing.

Methods. An interviewer-administered survey collected data on perceived time to walk to parks, park use time, park physical activity time and wellbeing (using the Stanford WELL for Life Scale, containing nine domains) amongst adult participants of the Singapore Multi-Ethnic Cohort. Geospatial maps of parks and the “walkable” street networks were created for the city-state of Singapore to objectively determine distances to accessible points on park boundaries. Multiple linear regression models estimated the importance of park access to park use and associations of park access and park use with wellbeing, adjusting for potential confounders.

Results. Participants' (n=3 435) average age was 48.8 years (SD, 12.8), 44.8% were male and 72.6% were of Chinese ethnicity. Better perceived but not true park access was significantly associated with greater park use. Park access (perceived or true) was not associated with physical activity time in parks. As participants' park time and physical activity time in parks increased there was a statistically significant increase in wellbeing scores ($p<0.001$). The differences in wellbeing scores between the reference groups, who spent negligible time in parks, and the highest quartiles of time in parks (10.8 hours/month) and physical activity in parks (8.3 hours/month) were 3.2 (95% CI 2.1-4.4) and 4.2 (95% CI 4.1-6.3) points out of 100 respectively. These associations were similar for most domains of wellbeing, with clear dose-response relationships.

Conclusions. While perceived park access was strongly associated with park use and well-being, true park access was not, and neither park access measure was associated with park physical activity. The consistent associations of park use and particularly physical activity in parks with wellbeing suggest that promoting park use, and especially physical activity in parks, is a promising strategy for improving wellbeing in urban settings.

Area-level associations of physically active and sedentary travel with overweight/obesity: A data linkage study

Prof. Takemi Sugiyama^{1,2}, Dr. Manoj Chandrabose¹, Dr. Rachel Cole³, Dr. Nyssa Hadgraft^{1,2}, Prof. Neville Owen^{1,2}

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Special Interest Group: H. Policies and environments (SIG)

Purpose: Studies using individual-level data have shown that physically active travel (walking, cycling) is associated with lower overweight/obesity risk, while sedentary travel (car use) is associated with higher risk. Area-level evidence of how prevalence of active/sedentary travel is related to obesity rates is also needed to inform transport and planning policies. However, there is little area-level evidence on travel behaviours and overweight/obesity. We examined the relationships by linking travel and health surveys.

Methods: Travel behaviour data were obtained from 41,544 adult participants of travel surveys conducted in Australia in 2009–10. Obesity data were derived from the 2014–15 Australian National Health Survey. Aggregated data from these surveys were linked at the level of Population Health Area (PHA). The exposure measures were the proportion of participants engaged in active (≥ 30 min/d in active modes and 0 min/d in cars), mixed (>0 min/d in active modes and in cars), and sedentary travel (0 min in active modes and >0 min/d in cars) in each PHA. The outcome measure was the age-standardised rate of higher waist circumference (>94 cm for men; >80 cm for women, objectively measured). Bayesian conditional autoregressive models examined associations of the outcome with the proportions of active, mixed and sedentary travel participants.

Results: On average, 63% of health survey participants in the study areas (160 PHAs) had higher waist circumferences. The mean proportion of travel survey participants engaged in active, mixed, and sedentary travel was 6%, 14%, and 75%, respectively. After adjusting for area-level covariates, one standard deviation increment in the proportion of active, mixed, and sedentary travel was associated with 1.4% lower (95%CI: -3.6, -0.4), 0.9% lower (-2.7, -0.3), 1.9% higher (1.1, 3.8) rates of higher waist circumference, respectively.

Conclusions: PHAs with more active and mixed travel participants had lower prevalence of overweight/obesity, while those with higher proportions of sedentary travel participants had higher prevalence. Our study suggests that walking/cycling can be protective against obesity even in the presence of car use. Environmental and policy initiatives to promote active travel are recommended in areas where sedentary travel is predominant.

Using an interactive 3D model before environmental changes take place: differences in perceived safety and -appeal related to cycling for transport

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¹Ghent University, Ghent, Belgium

Special Interest Group: H. Policies and environments (SIG)

Purpose: Environmental interventions can enhance cycling for transport but are expensive and hard to change once executed. Therefore, this study investigated if the “future environment” is perceived as more safe and more appealing by visualising it in a 3D model and comparing this to perceptions of the current environment. Secondly, there is explored whether age, gender, socio-economic status, participants’ perceived ability to interpret a 2D plan, cycling behaviour/experience and active transport habits moderate these associations.

Methods: This cross-sectional study used a web-based survey, completed by 360 participants (data collection ongoing). The environment where environmental changes are planned was visualized by means of three different **Methods:** (1) a video from the current environment, (2) a 2D plan visualizing the planned environmental changes and, (3) an interactive 3D model from the future environment in which participants could virtually cycle through on their computer. Overall perceived safety and -appeal as well as perceived safety and -appeal of specific environmental factors (e.g. greenery) were rated on a Likert scale. Furthermore, possible moderators were assessed. Repeated Measures Manova and linear regression analyses were used for the statistical analysis.

Results: Overall safety- and appeal perceptions were higher in the future environment, compared to the current environment ($p < 0.001$). According to possible moderators, female ($p = 0.031$) and younger participants ($p = 0.035$) perceived the current environment less safe than male and older participants, while there were no differences in safety perceptions according to gender or age in the future environment. Additionally, participants who found it difficult or could not interpret a 2D plan assessed the 2D plan less safe and -appealing in comparison to participants who found it easy or were able to interpret the 2D plan, while there were no differences in safety- and appeal perceptions in the future environment ($p < 0.001$). More comprehensive and qualitative results will be presented at the conference.

Conclusions: This innovative methodology is an inexpensive and effective way to assess if the future environment is an improvement compared to the current one. Additional, subgroup differences and participant’s concerns about the environmental adaptation could be a valuable source of information for different stakeholders involved in urban planning.

Adolescents Perceptions of Walking and Cycling to School Differ Based on How Far They Live from School

Prof. Sandra Mandic^{1,4}, Dr. Enrique García Bengoechea², Associate Professor Debbie Hopkins³, Associate Professor Kirsten Coppel⁴, John Spence⁵

¹Auckland University of Technology, Auckland, New Zealand, ²University of Limerick, Limerick, Ireland, ³University of Oxford, Oxford, United Kingdom, ⁴University of Otago, Dunedin, New Zealand, ⁵University of Alberta, Edmonton, Canada

Special Interest Group: H. Policies and environments (SIG)

Purpose: Adolescents and their parents perceive different barriers for walking versus cycling to school and parental perceptions also vary by home-to-school distance. This study examined whether adolescents' perceptions of walking and cycling differ by home-to-school distance.

Methods: Adolescents (n=1,401; age: 15.1±1.4 years; 55.1% females) completed an online survey about their school travel and perceptions of walking and cycling to school in Dunedin, New Zealand. Based on home-to-school distance, adolescents were categorised into three groups: 'walkable' (≤2.25 km; n=455), 'cyclable' (>2.25-≤4.0 km; n=286) and 'beyond cyclable' distance (>4.0 km; n=660).

Results: Although rates of active transport to school decreased with increasing distance ('walkable'/'cyclable'/'beyond cyclable': 60.1%/16.4%/1.2%; p<0.001), most adolescents perceived walking and cycling to be healthy irrespective of distance to school. The proportion of adolescents intending to walk to school decreased with increasing distance (68.6%/30.1%/7.9%; p<0.001) whereas the proportion of those intending to cycle to school was low across all distance groups (2.9%/4.9%/4.2%; p=0.308). As distance to school increased, adolescents more frequently reported personal barriers (e.g., after-school schedule, for walking: 24.4%/44.4%/60.9%; for cycling: 42.0%/54.9%/73.0%), environmental barriers (e.g., distance perceived to be too far: for walking: 10.5%/52.4%/87.7%; for cycling: 11.4%/41.6%/81.1%) and safety-related barriers (for walking: 7.5%/14.3%/44.8%; for cycling: 35.4%/43.7%/63.9%); and decreased peer support (for walking: 61.3%/27.3%/13.3%; for cycling: 19.6%/18.2%/12.0%) and parental support (for walking: 78.5%/47.9%/16.4%; for cycling: 24.0%/22.4%/14.5%) (all p<0.001). Perceived absence of footpaths increased with distance 5.7%/14.0%/44.1%; p<0.001, while perceived absence of cycle lanes (61.5%/65.7%/65.8%, p=0.243) did not differ across distance categories. As distance increased, adolescents expressed greater concerns for too much traffic (27.5%/48.3%/63.9%), dangerous intersections (26.4%/42.0%/58.5%) and hills (23.1%/48.3%/62.7%) along the school route and increased trip chaining convenience (41.3%/72.0%/84.2%) (all p<0.001).

Conclusions: Adolescents' perceptions of walking and cycling to school differed by distance to school. With increasing distance to school, social support for both modes decreased while personal, environmental and safety barriers became more pronounced. Absence of cycle lanes and low interest in cycling to school were consistent barriers across all distance categories. Thus, distance to school needs to be accounted for in active transport to school initiatives and walking- and cycling-specific barriers tackled.

**O1.02 - Studies on motivation in nutrition and physical activity,
June 8, 2021**

Changes in food behaviours before and during the COVID-19 pandemic: a nationally representative survey of the Australian population

Ms Ashleigh Hart¹, Mr. Joseph Santos¹, Ms. Emalie Rosewarne¹, Dr. Kathy Trieu¹, Prof. Jacqui Webster¹

¹The George Institute for Global Health, NSW, Australia

Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: The COVID-19 pandemic has had a multitude of flow-on effects on populations around the world. In Australia, lockdowns mandated people to stay at home and food retail outlets such as cafes and restaurants to close. Between March and July 2020, almost 300,000 jobs were lost. The objective of this study was to determine the changes in consumer food behaviours before and during the COVID-19 pandemic in Australia as part of a broader survey on salt.

Methods: A nationally representative cross-sectional survey of the Australian adult population was conducted in 2020 to assess the current knowledge, attitudes, and behaviours towards salt. As part of the survey, participants were asked to complete three COVID-19 behaviour questions about planning and purchasing foods, barriers to cooking, and types of foods consumed. A probability proportional to size sampling was used to recruit participants from all states, stratified by age group and sex, through a commercial online research panel provider. Logistic regression was used to determine changes over time. Analyses were weighted using the 2016 Australian census data.

Results: 4022 participants completed the survey. Positive behaviour changes were observed, including planning meals ahead of time (+6.1%), making a list before going shopping (+4.1%), planning meals to include all food groups (+4.3%), and checking the nutrition information panel and other information on food labels to make food choices (+2.1 and +2.2%; all p 's < 0.001). Participants perceived time as less of a barrier to cooking during COVID-19 (-5.9%; p < 0.001), however access to food was perceived as more of a barrier (+2.4%; p < 0.001). Regarding foods consumed, intake of salty snacks increased (+2.5%; p < 0.001), although positively, reduced consumption of processed meats (-4.8%; p < 0.001), and small increases in consumption of fruit (+1.2%; P = 0.056) and legumes/pulses (+1.3%; P = 0.023) were observed.

Conclusions: Positive behaviour changes regarding planning and purchasing of foods during the COVID-19 pandemic compared to before may indicate motivation of Australians to improve the healthiness of their diets as well as reflect increased time to do so. However, changes in barriers to cooking and types of foods consumed were mixed suggesting differential experiences of COVID-19 in subgroups within the Australian population.

Evidence-based lifestyle guidelines and self-management strategies utilized by women with polycystic ovary syndrome: descriptive measures of their awareness, use and sources of lifestyle interventions

Dr. Stephanie Cowan¹, Ms. Angela Grassi², Ms. Lynn Couch², Dr. Yvonne Jeanes³, Dr. Siew Lim¹, Dr. Stephanie Pirotta¹, Dr. Jeff Harris², Prof. Lisa Moran¹, **Dr. Caroline McGirr¹**

¹Monash University, Melbourne, Australia, ²West Chester University of Pennsylvania, Pennsylvania, United States of America,

³University of Roehampton, London, United Kingdom

Special Interest Group: B. Motivation and behavior change (SIG)

Polycystic ovary syndrome (PCOS) is a complex endocrine disorder affecting 13% of reproductive-aged women. Lifestyle management (diet, physical activity and behavioural) and is the first-line treatment for improving reproductive, metabolic and psychological complications in PCOS, however women experience challenges with this. There is a need to better understand how women with PCOS engage with evidence-based dietary and physical activity (PA) interventions. The primary aim of this study was to identify the types and sources of dietary and PA interventions implemented by women with PCOS. A secondary aim was to understand how they use behavioral and cognitive self-management strategies to support behavioral change. In this cross-sectional study an online questionnaire was disseminated via the PCOS Nutrition Centre (a consumer-based website) and a PCOS symposium hosted by the largest non-profit PCOS organization (PCOS Challenge: The National Polycystic Ovary Syndrome Association) between May 2015-May 2016. Women (n=1167) were aged 18-45 years, primarily born within the United States (70%) and self-reported a PCOS diagnosis. While only 33% and 16% of women reported following formal nutrition or PA guidelines (respectively), 57% had implemented a 'special diet' to help manage their PCOS. Many of these diets, including ketogenic, dairy and gluten free diets, were not supported by evidence-based PCOS practice. Participants also displayed a low level of engagement with important self-management behaviors, including goal setting and positive self-talk. The internet was the primary source of nutrition (36%) and PA (32%) information, with few turning to health professionals including doctors (nutrition 16%; PA 13%) and dietitians (nutrition 4.8%; PA 2.4%). These findings suggest that online information may promote inaccurate non-evidence-based lifestyle advice, and indicates a need to increase engagement with qualified health professionals. As current lifestyle advice for PCOS management utilized by health professionals are based on generic national guidelines, it is possible that this one-size-fits-all approach does not satisfy their desire for more personalized recommendations. It is also likely that health professionals will need to diversify their mode of communication through the delivery of online lifestyle education.

How street quality influences the walking experience: a naturalistic inquiry into the perceptions of adults with diverse ages and disabilities

Tamara Bozovic¹, Professor Erica Hinckson¹, Dr. Tom Stewart¹, Associate Prof. Melody Smith²

¹Auckland University of Technology, Auckland, New Zealand, ²University of Auckland, Auckland, New Zealand

Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: In urban areas, shifting trips to walking contributes to physical activity and independent movement, but also climate action and noise reduction. While research on walkability has made significant progress, there is still no consensus on what people perceive as barriers. This study examined the barriers as perceived by 56 adults with diverse disabilities and ages, living in Auckland New Zealand. The theoretical framework is the Social Model of Walkability, assuming that people's perceptions and individual characteristics play a key role as moderators between walking environments and walking as a behaviour.

Methods: In audio-taped 1-on-1 interviews, participants reported on (1) the trips usually walked (purpose, reasons to choose walking, specific features considered as difficult or unpleasant, or conversely enjoyed); and (2) desired destinations usually not walked to, within a distance perceived as walkable (type of destination, reasons why the trip is not walked, specific barriers). Trips and barriers were mapped on paper with the participants. Content analysis was used to better understand perceived difficulties and the choice of walking.

Results: Three major dimensions were found: (1) the importance of the quality of walking environments, including traffic and infrastructure, identifying aspects most cited as barriers; (2) the importance of transport alternatives and their quality in the choice of walking; and (3) the disproportionate burden of the transport system placed on disabled users.

Conclusions: This study tested the Social Model of Walkability and contributes to a better understanding of walking as a behaviour across ages and abilities. It also contributes to transport planning and urban design by providing insights into specific features perceived as barriers to walking, in a car-dominated environment. Future research should measure and characterise the encountered barriers.

Seeking to understand the dietary behaviours of individuals with T2D

Miss Roshan Rigby¹, Prof. Lauren Williams¹, Dr. Lana Mitchell¹, Associate Professor Lauren Ball¹, Associate Professor Kyra Hamilton¹

¹Menzies Health Institute Queensland, Griffith University, QLD, Australia

Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: Type 2 Diabetes (T2D) is a global health concern. A healthy diet is the cornerstone of diabetes management but usually requires behaviour change. Understanding how dietary change occurs may contribute to better-targeted intervention strategies for individuals. Well-established models of behaviour change can help deepen this understanding. The current study explored the psychological decision-making processes involved in dietary change after a T2D diagnosis.

Methods: A descriptive, interpretive methodology was used. Adults diagnosed with T2D who had consulted with a dietitian were purposively sampled from the “3D Study” participant database, a longitudinal case series study exploring dietary changes after a T2D diagnosis. Twenty-one semi-structured interviews were conducted. Theoretical thematic analysis was guided by the Integrated Behaviour Change (IBC) model to deductively match themes to the motivational, volitional, and implicit decision-making processes involved in dietary change.

Results/findings: Nineteen themes were identified and categorised under the motivational, volitional, and implicit processes of the IBC model. Motivation to change diet stemmed from wanting to improve diabetes health status, reduce further complications, and to not take medication. Participants described making use of support networks such as family, friends, and attended diabetes group meetings. Most had an intrinsic desire to change and felt capable and responsible for making positive changes. Some had post-diagnosis realisations that caused them to prioritise their health. Volitional influences included coping self-efficacy, action planning to meet behaviour goals, and awareness of boundaries related to food. Implicit influences on dietary change included unlearning habits and planning for the availability of recommended foods. Individual difference factors and emotions were identified in the data as influencing diet change but are not in the IBC model.

Conclusions: This study was the first to our knowledge to use the IBC model to understand dietary change in adults with T2D. There are substantial decision-making processes involved in dietary change after a T2D diagnosis. Interventions need to address the psychological processes involved in decision-making to support positive change. Health care professionals can use the findings of this research to understand the patient experience and the influence early intervention may have in supporting optimal dietary behaviour change for T2D management.

A physical activity coaching intervention increases and maintains physical activity and health-related outcomes in non-admitted hospital patients: the Healthy4U-2 randomised controlled trial

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Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: Insufficient physical activity (PA) is a major public health problem and is associated with a range of chronic diseases and associated morbidity. Individuals with chronic disease morbidity are frequent users of complex hospital services, and hospitals need effective and accessible prevention programs targeting high-risk individuals to increase PA and promote individual self-management. This study aimed to test the effectiveness of a twelve-week, physical activity (PA) coaching intervention for changes and maintenance in PA, anthropometrics and health-related outcomes in adults presenting to an ambulatory hospital clinic.

Methods: One hundred and twenty insufficiently active adults were recruited from an ambulatory hospital clinic and randomised to an intervention or control group. The intervention group received an education session and five 20-min telephone sessions of PA coaching. The control group received the education session only. Secondary outcome measures included anthropometrics, PA self-efficacy, and health-related quality of life. Outcome measures were assessed at baseline, post-intervention (3-months) and follow-up (9-months). A series of mixed-model ANOVAs (within:time; between:intervention) were used to assess the effects of the PA coaching intervention on each outcome variables separately.

Results: At baseline, the mean age and body mass index of participants were 53 ± 8 years and 31 ± 4 kg/m², respectively. The attrition rate was low, with 90% of participants remaining at 9-months. Relative to control, the intervention group increased objectively measured MVPA at post-intervention ($p < 0.001$) and 9 months follow-up ($p < 0.001$). At the 9-month follow-up the measured MVPA was 22 min/day (95%CI: 20 to 25 min/day) in the intervention group, which was sufficient to meet the recommended PA guidelines. The intervention group also demonstrated beneficial changes in body mass ($p < 0.001$), waist circumference ($p < 0.001$), BMI ($p < 0.001$), PA self-efficacy ($p < 0.001$), and health-related quality of life ($p < 0.001$) at the 9-month follow-up.

Conclusions: This study demonstrates that for insufficiently active adults presenting to an ambulatory hospital clinic, a PA coaching intervention resulted in improvements in PA and health-related outcomes that were maintained to 9 months follow-up. Ambulatory hospital appointments provide an important opportunity for initiating PA behaviour change, and PA coaching is an efficacious tool for the prevention and management of chronic disease.

A dietitian-led model incorporating behaviour change with Very Low Calorie Diet intervention can achieve weight loss to facilitate elective surgery for adults with obesity

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Special Interest Group: B. Motivation and behavior change (SIG)

Adults with obesity undergoing elective surgery have increased risk of excess blood loss, wound infection, and prolonged hospital stays, and surgeons may prohibit surgeries for patients with obesity until they lose weight. The dietitian-led preoperative Very Low Calorie Diet (VLCD) model of care was established to achieve significant weight loss for patients with obesity while maintaining nutritional adequacy prior to non-bariatric elective surgery. This study aimed to determine efficacy of the model.

Eligible patients were adults referred by surgeons over 23 months who engaged in VLCD-based treatment (n=78). Weight loss targets were set by the surgeon in order to proceed to surgery. The dietitian prescribed individualised VLCD-based treatment and provided individual fortnightly nutrition education and counselling incorporating behaviour change strategies. Patients attended fortnightly appointments, and dietitian treatment was generally limited to 12 weeks but continued until surgery. The primary outcome of the study was efficacy, which was evaluated through effectiveness of treatment, feasibility, and stakeholder value (patients and surgeons). Data were collected from medical charts, and patients and surgeons were surveyed. Descriptive analyses were used.

Seventy-eight eligible patients were treated (45±13yrs, 90%F, BMI 44.3±6.2kg/m²). Weight loss achieved was 9.0±6.7kg (7.4±5.3% body weight). Most patients (70%, n=50/71) achieved sufficient weight loss over median 10 weeks to proceed to surgery. Fifty-six percent of patients (n=43/77) reported side effects, most of which were resolved. All surveyed patients (n=24) reported being satisfied with the dietitians' counselling and agreed that they had learned knowledge/skills to improve their long-term health. Surgeons reported that VLCD treatment assisted with ease of operation (83%, n=10/12) and shortened operating time (75%, n=9/12).

The dietitian-led preoperative VLCD model of care was feasible and effective in achieving clinically and statistically significant weight loss which was adequate to proceed with elective surgery for most patients. Dietitian-led treatment incorporating behaviour change counselling was highly valued by patients and surgeons, and surgeons perceived benefits to surgery. This model could be beneficial for facilities which offer elective surgery to obese patients. A larger study with a control group is planned to confirm reduction in surgical complications.

**O1.03 - Implementation and evaluation of lifestyle programs for
different populations,
June 8, 2021**

Effectiveness of a culinary course on high school students' food literacy, eating behaviours and consumption of vegetables and fruits

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Special Interest Group: F. Early care and education (SIG)

Purpose: Better food literacy is associated with healthier eating behaviours and greater vegetables and fruit consumption. However, the reliance of parents on take-out and prepackaged foods, and the removal of home economics education in schools has reduced the opportunities for adolescents to develop their food literacy skills. Therefore, elective high school culinary courses may play a role in improving food literacy and adolescents' health through better nutrition. This study assessed the effectiveness of an 18-week elective high school culinary course on student's food literacy, eating behaviours and vegetables and fruit consumption as compared to students enrolled in a personal and social development (PSD) course.

Methods: Students enrolled in a culinary course (n = 159) or in a PSD course (n = 315) in five high schools in New Brunswick, Canada, were recruited for this quasi-experimental study. Students completed a self-administered questionnaire during the first week (September) and last week (January) of the 2019 fall semester. The questionnaire assessed students' food literacy, including cooking and food skills, vegetables and fruit consumption and eating behaviours. Group differences were assessed with mixed-effect models. Separate gender analyses were conducted.

Results/findings: Girls enrolled in the culinary course reported greater improvements in overall food literacy (22.31 vs 3.39, p=0.005), food skills (9.27 vs 0.95, p=0.022) and cooking skills (13.04 vs 2.45, p=0.009) than those in the PSD course. Boys in the cooking course reported greater improvements in overall food literacy (15.61 vs -3.32, p=0.014) and cooking skills (11.36 vs -1.31, p=0.002) than those in the PSD course, but not food skills (4.26 vs -2.00, p=0.158). For both genders, no effect was found for the consumption of vegetables and fruits (p=0.61), nor for eating behaviours (p=0.42).

Conclusions: High school culinary courses are effective at improving overall food literacy and cooking skills in both genders, as well as food skills among girls. These findings support the importance of offering such courses in high schools. Reintegration of these types of courses within the curriculum is highly encouraged.

A multi-strategy implementation intervention increases Australian schools' implementation and maintenance of a mandatory physical activity policy: outcomes of a cluster RCT

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Special Interest Group: E. Implementation and scalability (SIG)

Purpose: Many jurisdictions have policies that stipulate the number of daily or weekly minutes of physical activity (PA) that schools are required to schedule. Unfortunately, the implementation of such policies is less than optimal. The potential public health benefits that may result from these policies requires population-wide implementation. This study aimed to determine the effectiveness of a multi-strategy implementation intervention on increasing teachers' implementation and maintenance of a mandatory PA policy.

Methods: A cluster RCT was undertaken with 61 primary schools within the Hunter New England region of Australia. Designed using the Behaviour Change Wheel and Theoretical Domains Framework a 12-month multi-strategy implementation intervention was delivered to schools which included; centralised technical assistance, ongoing consultation, principal's mandated change, training school champions, development of implementation plans, educational outreach visits, provision of educational materials. Control schools received usual support. The primary outcome was weekly minutes of structured PA implemented by classroom teachers. Structured PA included time in physical education (PE), sport or in class PA such as integrated lessons or energizers. Data were collected at baseline (October-December 2017), 12-month (October-December 2018) and 18-month (April-June 2019) follow-up. Data were analysed using linear mixed effects regression models.

Results: Overall 400 teachers provided valid primary outcome data at each time point. From baseline to 12-month follow-up, teachers at intervention schools recorded a greater increase in weekly minutes of PA implemented than teachers assigned to the control schools by an average of 45.30 minutes (95% CI: 33.75, 56.86; $p < 0.001$) which remained at 18-months, however the effect size was smaller (27.61 minutes; 95% CI: 15.99, 39.22; $p < 0.001$). The difference between groups in the change from baseline in proportion of teachers implementing the required 150 minutes of weekly PA favored the intervention group at both 12 (OR: 7.59; 95% CI: 3.89, 14.80, $p < 0.001$) and 18 months (OR: 3.54; 95% CI: 1.89, 6.65, $p < 0.001$).

Conclusions: A multi-strategy implementation intervention increased mandatory PA policy implementation. Some, but not all of this improvement was maintained after implementation support concluded. Further research into the impact of scale-up strategies on the sustainability of physical activity policy implementation over longer time periods is warranted.

Scale-up of an effective program to increase the delivery of a mandatory physical activity policy in primary schools

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Special Interest Group: E. Implementation and scalability (SIG)

Purpose: Despite departmental policies that mandate schools deliver a certain amount of physical activity per week, many schools find it difficult to meet such policies. The effectiveness of a multicomponent implementation intervention, the Physically Active Children in Education (PACE) intervention, in increasing teacher's delivery of physical activity, has previously been established in primary schools from one local health district in New South Wales Australia. This study aimed to evaluate the scale-up of PACE to primary schools across multiple health districts.

Methods: We conducted an uncontrolled before and after study, with 100 schools across three Local Health Districts in New South Wales, Australia. Guided by the RE-AIM evaluation framework, data was collected via project officer records, and principal and teacher surveys to assess: the reach (percentage who received the intervention), adoption (proportion taking up the intervention), implementation (extent to which the intervention is delivered as intended) and cost of PACE. Descriptive data were used to describe the reach and adoption of the program. Linear mixed models were used to assess implementation, by evaluating the difference in the number of minutes teachers delivered physical activity from baseline to follow-up. A prospective, trial-based economic evaluation of the intervention versus usual practice was used to assess cost.

Results/findings: Reach of PACE was high, with 90% (n=100) of schools receiving all components of the program. Adoption was high-to-moderate with most (>50%) schools adhering to the majority of program components (11 of the 13 components). Implementation was successful with teachers increasing their delivery of total physical activity across the school week by 26.77 minutes (95% CI: 21.16, 32.39, p<0.001) after receiving PACE. The incremental cost per additional minute of physical activity scheduled was \$39.11 per school (UI \$31.48, \$50.72) for the modelled adjusted result.

Conclusions: PACE has demonstrated to be a highly feasible, acceptable and implementable program that successfully supports teachers in increasing their delivery of physical activity. Given the ongoing and scalable benefits of PACE, it is

important that we continue to extend and improve this program, while considering ways to reduce the associated cost and resources.

Process evaluation of the trips4health randomised controlled trial: using incentives to increase public transport use for physical activity gain

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Special Interest Group: E. Implementation and scalability (SIG)

Purpose: In partnership with a public transport (PT) provider and state and local government, we designed a theory-informed single-blinded randomised controlled trial, trips4health, to increase transport-related physical activity (PA) through increased PT use. The intervention involved four months of incentives (PT smartcard credits) for achieving increasing weekly PT use targets and weekly supportive text messages. The PT provider issued smartcard credits, and a messaging service delivered text messages. This paper reports the process evaluation undertaken before outcomes analysis.

Methods: Process evaluation was guided by the Medical Research Council UK's framework for complex public health interventions. Data were collected through post-intervention surveys (analysed descriptively) and semi-structured interviews with participants, and partner interviews (before and during the study). Interviews were recorded, transcribed, and analysed thematically.

Results: The trial was placed on hold (March 2020) then abandoned (May 2020) due to COVID-19. At that time, 116 participants completed baseline measures, 110 were randomised, and 64 completed post-intervention measures. Of the intervention participants (n=29), smartcard incentives were well-received: 90% agreed they were helpful, 97% agreed they were liked, and 90% agreed they were received in a timely manner. Fifty-nine percent agreed the incentives motivated them to use PT more, but 56% felt they had no impact on PA. All text messages were delivered and well-received: 76% agreed the frequency was 'just right', 90% agreed they were easy to understand, 48% agreed messages were helpful, but only 19% agreed they were interesting; 45% disagreed that text messages made no difference to bus use or PA. In participant interviews (n=6), meeting targets was considered important but was not driven by financial gain; perceptions of who the intervention would impact on most differed by income. A suggested improvement was greater personalisation of text messages. In partner interviews (n=4), the intervention administration workload was not considered significant and the intervention was considered easy to upscale.

Conclusions: This process evaluation indicates that a program for incentivising PT use is acceptable for participants and feasible with support from key partners. This process evaluation provides important insights for the tailoring of strategies to increase PA through the incentivisation of PT use.

Perspectives on the effectiveness of a partnership approach to salt reduction in Australia

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Special Interest Group: E. Implementation and scalability (SIG)

Purpose: Public health partnerships can achieve better outcomes than any individual or organisation can alone by sharing knowledge and skills, more-efficiently utilising available resources and executing joint activities. This study aimed to understand stakeholder perspectives on the effectiveness of the Victorian Salt Reduction Partnership in delivering a complex, multi-faceted salt reduction intervention between 2014 and 2020 in the Australian state of Victoria.

Methods: Semi-structured interviews were conducted with 14 Partnership and seven food industry stakeholders in 2019. The Consolidated Framework for Implementation Research, designed to understand the effectiveness of intervention implementation, was adapted for the Partnership intervention and used to guide the qualitative analysis.

Results/findings: The Partnership was viewed as essential for intervention planning and decision-making and an enabler for intervention delivery. Partnership goals of capacity building and collaborative action were perceived to have been achieved. The implementation team executed intended intervention activities and outputs, with some adaptations to strategy. Barriers and enablers to implementation were identified by interviewees, such as conflicting individual, organisational and Partnership values and building positive relationships between the Partnership and food industry, respectively. Regarding the consumer arm of the multi-faceted intervention, stakeholders discussed an unsuccessful attempt to shift consumers along the Transtheoretical Model stages of change through three campaign waves. Perceived challenges in intervention delivery and engaging the target population were identified including limited campaign mediums as a result of tight budgets, the short intervention timeframes and ineffective campaign messaging for the target audience. The political and social climate was viewed as not conducive to achieving Partnership aims.

Conclusions: Establishing a Partnership with diverse skills and experience facilitated collaborative action, capacity building and execution of the salt reduction intervention. Monitoring and evaluating implementation of the intervention informed strategic adaptations, which allowed for optimisation of Partnership approach. Future public health partnerships should consider the importance of creating strong networks within the partnership and the balance between intervention adaptation and maintaining fidelity.

Health behaviour and financial impact of a healthy drink initiative in Australian sports and recreation food outlets

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Special Interest Group: E. Implementation and scalability (SIG)

Purpose: Sport and recreation facilities promote health through physical activity, yet their food outlets predominantly sell unhealthy food and drink. Limited studies explore the long-term impacts of implementing healthy retail initiatives. The aim of the study was to evaluate the impact of a government-led healthy drink initiative in food outlets at sporting facilities on health behaviour and financial impact on the sale of pre-packed drinks sold.

Methods: Electronic weekly sales data from November 2015 to February 2020 was provided by 8 seasonal, typically outdoor pools; and 10 non-seasonal outlets in Victoria, Australia. The initiative started in March 2018 and involved either limiting 'red' (unhealthiest) drinks to <20% of display, or removing 'red' drinks from display completely, whilst increasing display of 'green' (healthiest) drinks to >50%. Health behaviour was measured by weekly percentage of 'red' and 'green' drinks sold; and financial impact by total weekly sales for all drinks. Seasonal and non-seasonal outlets were analysed separately due to differences in seasonal sales patterns throughout the study period. Seasonal sales outcomes pre- and post-initiative were compared using multilevel linear models and non-seasonal outlets were analysed individually using an interrupted time series analysis.

Results: In seasonal outlets, the mean volume of 'red' drinks sold reduced from 47.9% to 25.4% and 'green' drinks increased from 40.8% to 50.5%. There was no statistical evidence of a change in total weekly drink revenue. The observed percentage volume of 'red' drinks sold in February 2020 was lower than what would have been predicted (had there been no intervention) in six of ten non-seasonal outlets, higher than predicted in two, and equivalent to predictions in two. The observed percentage volume of 'green' drinks sold was lower than what would have been predicted in one of ten non-seasonal outlets, higher than predicted in four, and equivalent to predictions in five. In nine of ten outlets, weekly drinks revenue in February 2020 was equivalent to predictions based on there being no intervention.

Conclusions: Reducing the availability of unhealthy drinks can be an effective public health policy to improve the healthiness of customer purchases without impacting revenue.

**O1.04 - Sleep, playtime, ADHD, wellness and PA/food literacy in
children and youth,
June 8, 2021**

A longitudinal analysis examining the associations of tummy time with active playtime, screen time and sleep time

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Special Interest Group: G. Children and families (SIG)

Purpose: Evidence links tummy time to infants' health outcomes. However, the associations between tummy time and other movement and sleep behaviours remains unknown. The purpose of this study is to examine associations of tummy time with active playtime, screen time, and nocturnal sleep time of children aged 12- and 24 months old.

Methods: A longitudinal analysis was conducted using data extracted from an Australian trial. Telephone interviews were conducted to collect data from 1,155 women at baseline (3rd trimester of pregnancy) and when their children reached 6-, 12- and 24-months old.

Results: Children who started tummy time within 4 weeks of age were more likely to have > 10 hours sleep at night at 12 months (AOR 1.54, 95% CI 1.08 – 2.19). They were more likely to have >3 hours per day of outdoor play and have <1 hour per day of screen time at 24 months. Children who practised tummy time every day were more likely to have >2 hours per day of active play at 12 months and have <1 hour per day of screen time at 24 months.

Conclusions: Starting tummy time earlier and more frequently was associated with favourable movement and sleep behaviours of young children at 12- and 24 months old.

A systematic controlled trial of a parent-focused physical literacy intervention for early childhood

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Special Interest Group: G. Children and families (SIG)

Purpose: Parents play a key role in young children's physical activity, including the development of physical literacy via fundamental movement skills. To date, little research has explored parent-focused interventions to improve young children's physical literacy. The primary objective of this study was to determine if a potentially scalable physical literacy training workshop called PLAYshop could increase parental knowledge and confidence related to engaging in play with their preschool-aged child (3-5 years) to facilitate physical literacy.

Methods: We conducted a pragmatic, systematic controlled trial in two Canadian cities from December 2019 – March 2020. The PLAYshop was designed using the Behaviour Change Wheel and Bandura's social cognitive theory. Participants assigned to the intervention group received a 75-minute workshop inclusive of interactive activities and educational messages derived from physical literacy concepts. To support physical literacy development at-home, parents were provided with educational materials, a 'goody bag' of resources, and booster emails sent at two time points after the workshop. Participants assigned to the control group received the workshop and equipment at a later date. Parents' knowledge and confidence of key physical literacy constructs were measured via baseline and follow-up surveys. Parent's application of workshop learnings at-home were qualitatively explored using semi-structured telephone interviews. Repeated measures ANOVAs and thematic analyses were completed.

Results/findings: A total of 89/143 eligible parents provided complete data from the intervention (n=39) and control group (n=50); 33 parents from the intervention group participated in telephone interviews. Parents' knowledge and confidence relating to all physical literacy constructs improved significantly over time across both groups, but the changes in the intervention group were significantly greater than those in the control group. Additionally, parents applied key concepts of physical literacy at-home (e.g. child-led play, making activities fun, and promoting child manipulative and locomotor skills).

Conclusions: Parents' self-reported knowledge and confidence to assist their child in developing physical literacy significantly increased after participating in the PLAYshop. The key concepts of physical literacy were also translated to parents' purposeful play with their child at-home. The findings from this real-world trial address an important evidence gap and highlight a feasible intervention that warrants further testing.

A Device-Based Assessment of Children's Sleep Consistency during the COVID-19 Pandemic Compared to Previous Years

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Special Interest Group: G. Children and families (SIG)

Purpose: The COVID-19 pandemic has altered children's daily lives via the transition to virtual schooling, cancellation of extracurricular activities, and implementation of physical distancing among other mitigation strategies. Previous cross-sectional and retrospective longitudinal studies suggest children's sleep timing has shifted later, while findings regarding sleep duration have been mixed. To date, it is unknown how the pandemic has impacted the day-to-day consistency in children's sleep duration or timing. This interrupted time series design examined children's sleep duration and midpoint consistency during the COVID-19 pandemic compared to previous data from the same children during the same time periods in each of the two years prior.

Methods: As part of a larger cohort, 209 children (7-12 years, 52% female) wore a Fitbit Charge-2 on their non-dominant wrist for 6-week measurement periods during the spring (April/May) and summer (June/July) from 2018-2020. Consistency of sleep duration (minutes asleep between sleep onset and offset) and timing (sleep midpoint, time halfway between onset and offset) were calculated. Child-level individual standard deviation for duration and timing were calculated within each 6-week measurement period. Multilevel mixed models compared changes in consistency before the pandemic (2018-2019) to changes after the pandemic onset (2019-2020). Covariates included mean sleep duration, age, sex, and race.

Results: Prior to the pandemic (difference between 2018 and 2019), there were no changes in the consistency of children's sleep duration (spring: -4.8 minutes, 95%CI=-12.2, 2.5; summer: -2.6 minutes, 95%CI=-11.8, 6.6) or timing (spring: -8.0 minutes, 95%CI=-19.9, 3.9; summer: -9.1, 95%CI=-24.2, 6.0). During the pandemic spring, both sleep duration and timing became more inconsistent by 20 minutes (95% CI=6.4, 34.4) and 33 minutes (95% CI=10.5, 56.4), respectively. During the pandemic summer, sleep timing became more inconsistent (+46 minutes, 95% CI=19.2, 74.8), while there was no change in duration consistency.

Implications: Inconsistent sleep duration and timing during the pandemic is concerning given their link to poor health behaviors, which may ultimately lead to unhealthy weight gain. Future intervention strategies should consider consistency of sleep duration and timing to alleviate long-term effects on children's health.

A cluster-randomized trial assessing comparative effectiveness of two SWITCH implementation processes for school wellness programming

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Special Interest Group: G. Children and families (SIG)

Purpose: The School Wellness Integration Targeting Child Health (SWITCH) has demonstrated feasibility as a promising implementation process designed to help schools facilitate changes in students' physical activity (PA), sedentary screen time (SST), and dietary intake (DI). This study evaluated the comparative effectiveness of an intensive individualized implementation approach with a group implementation approach, and whether effectiveness differed by student gender.

Methods: Iowa elementary schools (N=22) participated in the 2017–2018 iteration of SWITCH. The schools were predominantly rural with heterogeneous total enrollment (N=57–521), and free/reduced lunch status (8.5–59.4%). All schools received standardized training (school wellness conference and preparatory webinars). Schools were matched within region and randomized to receive either enhanced (individualized monthly webinars with motivational interviewing) or standard (group) implementation support during 12 weeks of SWITCH intervention programming. PA, SST, and DI outcomes of 1,097 students were assessed at pre- and post-intervention periods via Youth Activity Profile (YAP), a validated and calibrated online self-report instrument. A series of mixed models were used to evaluate differential change in outcomes by condition (adjusting for school region and gender) to determine comparative effectiveness, and to test for differential change by condition by gender. Alpha was set at 0.01.

Results: Both conditions showed significant improvements in PA and SST over time ($p < 0.01$), but change was not significant for DI ($p = 0.023$ – 0.054). There were no differential changes between the standard and enhanced implementation conditions for PA ($p = 0.507$), SB ($p = 0.190$), and DI ($p = 0.725$). There were no significantly differential changes by condition by gender for PA ($p = 0.861$), SST ($p = 0.455$), or DI ($p = 0.150$). Effect size for both implementation conditions equated to approximately 6 minutes of improvement in moderate-to-vigorous physical activity per day.

Conclusions: The results indicate that enhanced individualized implementation support was not more effective than standard group implementation support for improving PA, SST, or DI. Given that the standard group support is less demanding than individualized support for both intervention staff and school personnel, this lack of difference is a welcome finding. Similarly, the lack of interaction by gender suggests that SWITCH can be effective for both boys and girls. Future studies will evaluate SWITCH at scale.

How does an adapted school-based physical activity policy implementation strategy compare? A randomised noninferiority trial

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Special Interest Group: E. Implementation and scalability (SIG)

Purpose: The Physically Active Children in Education (PACE) intervention is a proven-effective multicomponent implementation strategy to increase teacher's delivery of physical activity, consistent with a state-level policy mandate. The dissemination of PACE is necessary for population level benefit, but this may not be feasible for public health and/or school departments with limited resources. This study assessed whether an adapted variation of PACE (hypothesized to be more amenable to scale-up) was noninferior compared to the original PACE.

Methods: We employed a noninferiority cluster randomised controlled trial with 48 schools in the Hunter New England region of NSW, Australia. Schools were randomised to receive the original PACE intervention or an adapted PACE intervention. A rigorous process was used to determine adaptations, including literature reviews, mediation analysis, cost-effectiveness comparison, stakeholder input and consensus among the research team. The final modifications were: (A) teacher training delivered by an internal school champion instead of an external public health officer, and (B) school support provided via distance communication instead of face-to-face. The primary outcome of interest was teachers' scheduled minutes of weekly physical activity assessed at baseline (Oct 2018- Feb 2019) and 12-month follow-up (Oct- Dec 2019). The noninferiority margin was set at 17.9 minutes based on data from previous trials of PACE. Linear mixed models analyzed within a Bayesian framework were used to assess non-inferiority between the two versions of PACE.

Results/findings: The posterior estimate for the difference in the average minutes of weekly physical activity delivered by teachers at follow-up receiving the adapted PACE, compared to teachers receiving the original PACE is -2.3 minutes; with a 95% probability that the true difference lies between -18.02 and 14.45 minutes. There was an estimated 97.4% probability of the adapted PACE being considered non-inferior to the original PACE (i.e. adapted PACE no more than 17.9 minutes less than original PACE).

Conclusions: Adapted PACE is suitable for scaled-up service delivery. Further evaluation of implementation and cost-effectiveness will supplement these findings and corroborate evidence of its scalability.

**O1.05 - Scalable nutrition and physical activity interventions,
June 8, 2021**

Mental health practitioners: A promising pathway to promote park-based physical activity?

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Special Interest Group: E. Implementation and scalability (SIG)

Purpose: Physical activity (PA) is effective for preventing and treating multiple mental health symptoms. Training mental health practitioners (MHPs) to integrate PA recommendations into therapy may accelerate the reach of PA promotion efforts. The purpose of this study was to evaluate MHPs' receptiveness to a Park Prescription (ParkRx) training, which would equip MHPs to recommend park-based PA as part of their clients' treatment plans.

Methods: Four focus group sessions were conducted to ascertain MHPs' current practices and reactions to ParkRx. A total of 14 MHPs with 8.7 average years of experience in various settings participated.

Results: Most participants reported asking about PA in their current practice; about half reported regularly recommending PA to clients, but none had heard of ParkRx. MHPs identified several existing skills to facilitate PA counseling, including assisting clients with coping planning, recommending enjoyable movement instead of 'exercise', and using 'baby steps' to facilitate mastery experiences. Participants appreciated ParkRx's holistic health benefits and believed clients would be receptive to outdoor PA. Some disliked the idea of 'prescribing' PA and felt it could conflict with their therapeutic approach, particularly for clients presenting certain concerns (e.g., eating disorders, feelings of shame, suicidal ideation). All MHPs expressed the importance of a clear message on promoting wellbeing rather than a focus on exercise. Some MHPs shared concerns about whether ParkRx would add to their workload, but others were excited about the idea of going beyond the traditional 'walls of therapy' to rethink holistic therapeutic approaches. MHPs were receptive to training, especially if continuing education credits were provided. MHPs identified useful components of ParkRx training including: education about the mechanisms through which outdoor PA improves mental health, lists of parks and PA resources in the community, cards or pamphlets to distribute to clients, and practice with behavioral counseling techniques.

Conclusions: Few MHPs currently provide formal PA 'prescriptions,' but many had positive reactions to ParkRx and expressed interest in further training. Given their existing behavioral counseling skills and the frequency and duration of client interactions, MHPs represent a promising pathway for promoting park-based PA to enhance physical and mental health.

Small Studies, Big Decisions: The role of pilot/feasibility studies in incremental science and premature scale-up of behavioral interventions

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Special Interest Group: E. Implementation and scalability (SIG)

Background: Careful consideration and planning are required to establish “sufficient” evidence to ensure an investment in a larger, more-well powered behavioral intervention trial is worthwhile. In the behavioral sciences, this process typically occurs where smaller-scale studies inform larger-scale trials. Believing that one can do the same things and expect the same outcomes in a larger-scale trial that were done in a smaller-scale preliminary study (i.e., pilot/feasibility) is wishful thinking, yet common practice. Starting small makes sense, but small studies come with big decisions that can influence the usefulness of the evidence designed to inform decisions about moving forward with a larger-scale trial. The purpose of this presentation is to discuss what may constitute sufficient evidence for moving forward to a definitive trial. The presentation focuses on challenges often encountered when conducting pilot/feasibility studies, referred to as common (mis)steps, that can lead to inflated estimates of initial promise, and how the intentional design and execution of one or more, often small, pilot/feasibility studies can play a central role in developing an intervention that scales beyond a highly localized context.

Main Body: For any given intervention, the type and amount of evidence necessary to be deemed sufficient is inherently variable and can range anywhere from qualitative interviews of individuals representative of the target population to a small-scale randomized trial that mimics the anticipated larger scaled trial. Major challenges and common (mis)steps in the execution of pilot/feasibility studies discussed are those focused on selecting the right sample size, issues with scaling, adaptations and their influence on the preliminary signal observed, as well as the growing pains of progressing from really small to really large samples. Finally, funding and resource constraints for conducting informative pilot/feasibility study(ies) are discussed.

Conclusions: Sufficient evidence to scale will always remain in the eye of the beholder. An understanding of how to design informative small pilot/feasibility studies can assist in speeding up incremental science (where everything needs to be piloted) while slowing down premature scale-up (where any evidence is sufficient for scaling).

Descriptive Characteristics of Nutrition Incentive and Produce Prescription Projects Across the United States

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Special Interest Group: E. Implementation and scalability (SIG)

Purpose: Nutrition Incentive (NI) projects aim to increase purchase/consumption of fruits and vegetables (FVs) among low-income consumers by providing incentives (e.g., dollar-for-dollar match) at point-of-purchase. Produce Prescription (PPR) projects also aim to increase purchase/consumption of FVs among low-income consumers at elevated risk for chronic disease. PPR projects include partnering with healthcare providers and aim to reduce healthcare utilization and costs. The purpose of this study is to describe NI and PPR project characteristics across the United States (U.S.)

Methods: In 2019, grantees of the Gus Schumacher Nutrition Incentive Program (GusNIP) funded by the U.S. Department of Agriculture (USDA) reported quarterly descriptive data from participating firms to the coordinating center. Firms included brick and mortar (B&M) and farm-direct retail outlets that redeem incentives and clinics (PPR only). Variables reported included: food retail type, financial instrument (e.g., token), FVs eligible, other food assistance benefits accepted, incentive level ratio, and nutrition education provided.

Results: Across 23 grantees, there were 773 firms that reported data from B&M outlets (e.g., grocery stores) (n=206), farm-direct outlets (n=534), and clinics (n=33). Within B&M, the majority of NI projects operated in large supermarkets (31.8%) and independent grocery stores (29.9%), while the majority of PPR firms were small food stores (59.5%) and medium chain supermarkets (27.0%). The majority of farm-direct outlets for NI/PPR projects were farmers markets (82.6%-83.0%) and mobile markets (8.0%). For B&M, common financial instruments for redemption (i.e., purchases using incentive) were loyalty cards (35.1%), automatic discounts (21.5%), or paper vouchers (19.4%). For farm-direct, common financial instruments included tokens (60.9%) and paper vouchers (32.5%). Nutrition education was most common in clinics and mainly consisted of individual dietary consultation (39.3%), 1-on-1 coaching (35.7%), and diabetes prevention classes (28.6%). Other program characteristics will be compared and contrasted during the presentation.

Conclusions: This descriptive data provide a comprehensive portrayal of the nuances and differences in how NI and PPR projects are administered across settings in the U.S. Further research is needed to understand outcomes (e.g., redemption, behavior change) across these firm types and characteristics to help NI/PPR practitioners design and implement effective and efficient projects.

Choose to Move at Home: Rapidly adapting an effective health promoting intervention for older adults for the 'stay-at-home' COVID-19 environment

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Special Interest Group: E. Implementation and scalability (SIG)

The COVID-19 (COVID) pandemic shifted way of life for all Canadians. 'Stay-at-home' public health directives counter transmission of COVID but may cause, or exacerbate, older adults' physical and social health challenges. To counter unintentional consequences of these directives, we rapidly adapted an effective health promoting intervention for older adults (Choose to Move, CTM) to the home environment in British Columbia (BC).

Purpose: To 1) discern if it is feasible to adapt and implement CTM virtually (CTM-at-Home); 2) describe the impact, facilitators, and barriers of CTM-at-Home on older adult participant (OAP) mobility, physical activity (PA), and social connectedness (SC).

Methods: We conducted a mixed-methods triangulation design 4-stage formative evaluation of CTM-at-Home – a 3-month, single-group pre-post study with a convenience sample of OAPs and delivery partners (organization leads, provincial coordinators, recreation coordinators, activity coaches). We implemented 33 programs via Zoom during BC's acute and recovery stages of COVID (April-October 2020). Objective 1: We conducted semi-structured 30-45min telephone interviews with delivery partners (0-, 3-months). Objective 2: We collected survey data with validated tools to assess mobility, PA, and SC (0-, 3-months). We used basic descriptive analysis to describe health outcomes over time. We conducted semi-structured 30-45min telephone interviews with OAPs (0-, 3-months, follow-up during 2nd COVID wave). We used deductive framework analysis for all qualitative data to identify themes.

Findings: Objective 1: Delivery partners felt that CTM-at-Home was acceptable and feasible to deliver despite a few recruitment and technological challenges. They offered solutions to increase accessibility. Objective 2: 153 OAPs were included (86% female; 73+/-6 years). Approximately 2/3 of OAPs maintained or increased their mobility, PA, and SC while isolated at home (non-significant). Facilitators: PA motivation; accountability; SC. Barriers: lack of inclusive (age and ability) at-home exercise options; accessibility. Follow-up interviews suggested a severe decline in mobility, PA, and SC when at-home program support was withdrawn.

Conclusions: It is feasible and acceptable to adapt and deliver CTM virtually across BC. Longer-term, CTM-at-Home provides a preventive health program that can be scaled-up across Canada to promote older adults' physical and social health more generally, or in response to subsequent COVID waves.

Evidence-based diabetes prevention program implemented with fidelity by community organization

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Special Interest Group: E. Implementation and scalability (SIG)

Purpose: In-depth fidelity evaluations remain understudied. Fidelity evaluations examine the extent an intervention is delivered as intended and increases confidence that intervention results are due to the intervention itself. As a program translates from one context to another, knowing exactly what and how it was implemented is critical to understand program outcomes and provide feedback to subsequently scale and inform future research. The purpose of this study was to examine the delivery of, and engagement with, an evidence-based diet and exercise diabetes prevention program when delivered by fitness facility staff within a community organization.

Methods: This pragmatic study investigates the implementation of a community-based diabetes prevention program by a local community organization. Ten staff from this organization were trained to deliver an evidence-based program. Between August 2019 - March 2020, 26 clients enrolled in the program. Three fidelity assessments were completed. First, staff completed session-specific fidelity checklists (n = 156). Second, two audio-recorded counseling sessions from all clients underwent an independent coder fidelity check (n = 52). Third, staff recorded client goals on session-specific fidelity checklists and all goals were independently assessed for (a) staff goal-setting fidelity, (b) client intervention receipt, and (c) client goal enactment by two coders (n = 285). Fidelity scores were calculated for each checklist, converted into a percentage, and compared to independent coder fidelity checklists. Content analysis was used for staff goal-setting fidelity, client receipt of intervention, and client goal enactment.

Results: Average self-reported fidelity was 89.5% for all six sessions. Independent coder fidelity scores for the two assessed counseling sessions were 83% and 81%. Overall, staff helped clients create goals in line with program content clients indicated receipt of the program as intended and had a high goal achievement of 79%.

Conclusions: This study demonstrates relatively low-resource methods to assess program fidelity and client engagement. The program was implemented with high fidelity by fitness facility staff at a community organization and clients engaged with the program as intended. Findings increase confidence that program outcomes are due to the intervention itself and provide feedback to refine implementation strategies to support future scale-up efforts.

Cultivating Active Schools – A Key Element to Building Back Better in Antigua and Barbuda

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Special Interest Group: E. Implementation and scalability (SIG)

Purpose: Before the COVID-19 pandemic, only 22% of adolescents in Antigua and Barbuda were meeting the World Health Organization's (WHO) physical activity (PA) guidelines (Aguilar-Farias et al., 2018). Relatedly, up to 28.5% of adolescents in Antigua and Barbuda are overweight or obese (Walwyn & Hunte, 2012; World Health Organization, 2017). Opportunities for adolescent PA have likely decreased due to COVID-related closures and other lockdown restrictions. Integrating school-based PA strategies into policymakers' Building Back Better efforts is critical. The purpose of this study was to identify implementation challenges and facilitators to cultivating active secondary school environments in Antigua.

Methods: Eight interviews and 9 focus groups were conducted with Physical Education (PE) teachers and Grade 7 students from 9 secondary schools in Antigua, respectively. The schools were identified for study by the Antiguan and Barbudan Ministry of Education, Science and Technology. The socioecological model (McLeroy, Bibeau, Steckler, & Glanz, 1988; Stokols, 1996) guided the development of the interview and focus group questions to explore PA barriers and facilitators within the school environment. Thematic analysis was used to analyse the data.

Findings: Teachers and students discussed circumstances within their school environments that may hinder and facilitate the cultivation of active schools. One major hindrance is a culture of under-prioritization of PA in favour of key academic subjects, which translates into a lack of funding and resources allocated to PA opportunities and investment in supportive human resources to facilitate the implementation of PA opportunities. The lack of or poor maintenance of facilities and equipment also hinders the implementation of quality PE, sport, and non-competitive PA. Alternatively, existing activities such as mandatory PE until Grade 9 and other unique programs that celebrate PA including annual active days and competitions, create a conducive environment for implementing PA opportunities.

Conclusions: This study provides insight into an understudied population and context. Findings highlight some of the major barriers and facilitators to implementing PA opportunities in schools in Antigua and Barbuda, which can be explored and leveraged to cultivate active secondary schools in a time when active opportunities for adolescents are needed most.

**O1.06 -Urban food environments: standards, policies, and impact,
June 8, 2021**

Investigating change in the urban food environment over 10 years in New Zealand: a longitudinal study

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Special Interest Group: H. Policies and environments (SIG)

Background: While it is likely that changing food environments have contributed to the rise in obesity rates, very few studies have explored historical trends in the food environment with little, if any, consideration at a nationwide level. This longitudinal, nationwide, and geospatial study aims to examine change over time in food environments in all urban areas of New Zealand from 2005 to 2015.

Methods: This study used high quality food outlet data by area-level deprivation within the three largest urban areas of Auckland, Christchurch and Wellington. We hypothesise that distance and travel time by car to supermarkets and fast-food outlets will have decreased over time with the most notable decreases in distance occurring in the most deprived areas of urban New Zealand. Change in major chain “fast-food” and “supermarket” outlets as identified by Territorial Authorities between 2005 and 2015 was analysed through the use of multilevel regression models.

Results: Findings show a decrease in travel distance and time to both fast-food outlets and supermarkets. Distance to fast-food outlets decreased from 1,744m in 2005 to 1,557m in 2015 ($b=-211.13$ [95%CI -239.01,-183.25]) and distance to supermarkets decreased from 1,827m in 2005 to 1,401m in 2015 ($b=-574.54$ [95%CI -684.08,-464.27]). The biggest decrease in distance for supermarkets was seen in the most deprived areas. A significant interaction was noted for supermarkets and area-level deprivation ($p<0.001$) such that the largest decreases were seen in those most deprived deciles. No statistically significant interaction was present for fast-food.

Conclusions: Our findings contrast and add to previous evidence to demonstrate how changes in the food environment are not uniform, varying by area-level deprivation and with more equitable access to supermarkets occurring over time. Interestingly, these results suggest that changes in the food environment of urban New Zealand have not been unfavourable as access to supermarkets has improved in the most deprived areas over the last decade. However, it is important to note that this has only occurred in urban areas of New Zealand and other areas may not have experienced such positive equitable changes.

Food industry perspectives on potential policies targeting unhealthy food and beverage price promotions in Australian supermarkets

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Special Interest Group: H. Policies and environments (SIG)

Purpose: Marketing tactics used in supermarket settings may be an important contributing factor to dietary behaviour. Price promotions are a common marketing tactic used in supermarkets and often promote unhealthy options. Governments in Scotland and the UK have proposed policy restrictions on price promotions of unhealthy food and beverages, but little is known about the likely industry response to policy action in this area. The aim of this explorative study is to understand how potential policy actions related to food and beverage price promotions in supermarkets are perceived by food industry stakeholders.

Methods: Semi-structured in-depth interviews are being conducted with 12-15 key informants, including current and former representatives of major food manufacturers, food retailers and other industry experts with experience related to price promotion policies and practices in the Australian supermarket setting. The interview guide was informed by Lewin's organisational change theories. Key concepts included an exploration of organisational processes and the 'forces' that influence organisational strategy, to understand how price promotions are set and likely industry responses to potential policy action. Interview coding involves two stages with transcripts first analysed using a deductive approach and preliminary codes based on Lewin's theories, followed by inductive coding as new themes emerge.

Results/findings: The analysis is underway. Themes will relate to the facilitating and restraining 'forces' that may enable or inhibit the implementation of a healthy price promotion strategy in supermarkets. Using Lewin's force field analysis, the themes will be synthesised into a Force Field Model to conceptualise the 'forces' that require strengthening and/or reducing to aid a change in food and beverage price promotion practices. Preliminary analysis indicates that stakeholder buy-in will be important, but any policy would need to be mandatory across food retailers.

Conclusions: This study will provide insights on the potential barriers and enablers to changing the healthiness of food and beverage price promotions in supermarkets, which may inform the design of an effective public health strategy.

The assessment, planning and modification of food environments in regional Australia

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Special Interest Group: H. Policies and environments (SIG)

Purpose: In recent years there has been growing interest among researchers, urban planners and policymakers in the influence of the local food environment on household and individual food purchasing and consumption behaviour. The characteristics of regional food environments differ from those of urban food environments, however the importance of these characteristics in shaping food purchasing behaviours is unclear. Governments in many countries and at different levels have focused on improving health eating through a range of legislative, policy and practice strategies. For example, public health legislation in Victoria, Australia requires local governments to develop a public health and wellbeing plan every four years. Increasing healthy eating by investing in collaborative place-based approaches to healthy eating and increasing access to healthy food in communities has been identified as focus areas in the current planning cycle. However, it is unknown what priority regional local governments place on improving food environments, and what measures or indicators are used when incorporating action on food environments into the policy and planning process. The aim of this study was to identify how regional Victorian local governments prioritise, assess, plan and modify food environments to improve food access in regional Victorian communities.

Methods: Ten local government areas were purposively selected in inner and outer regional Victoria. A broad search of local government websites was conducted to identify, download and save publicly available policies and plans that may contain food environment improvement strategies. Policy documents were analysed using qualitative content analysis. A secondary key word search of the policy documents was undertaken to identify food access and food environment action, which was extracted and coded into relevant themes. NVivo v12 was used to support data analysis.

Results: Analyses are continuing, however preliminary analysis reveals regional local government policy documents contain limited action to improve local food environments.

Conclusions: Findings of this study will add new evidence and enhance understanding of the importance placed by regional local governments on improving food environments and food access for regional communities. Results will inform the development of recommendations regarding the potential role of local governments in improving food environments for regional communities.

Estimating the potential impact of Australia's reformulation programme on households' sodium purchases

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Special Interest Group: H. Policies and environments (SIG)

Purpose: On average, Australian adults consume 3500mg sodium per day, almost twice the recommended maximum level of intake. The Australian government through the Healthy Food Partnership initiative has developed a voluntary reformulation program with sodium targets for 27 food categories. We estimated the potential impact of this program on household sodium purchases (mg/d per capita) and examined potential differences by income level. We also modelled and compared the effects of applying the existing United Kingdom (UK) reformulation program targets in Australia.

Methods: This study used one year of grocery purchase data (2018) from a nationally representative consumer panel of Australian households (Nielsen Homescan) that was linked with a packaged food and beverage database (FoodSwitch) that contains product-specific sodium information. Potential reductions in per capita sodium purchases were calculated and differences across income level were assessed by analysis of variance. All analyses were modelled to the Australian population in 2018.

Results: A total of 7,188 households were included in the analyses. The Healthy Food Partnership targets covered 4,307/26,728 (16.1%) unique products, which represented 22.3% of all packaged foods purchased by Australian households in 2018. Under the scenario that food manufacturers complied completely with the targets, sodium purchases will be reduced by 50mg/d per capita, equivalent to 3.5% of sodium currently purchased from packaged foods. Reductions will be greater in low-income households compared to high-income households (mean difference -7 mg/d, 95% CI: -4 to -11mg/d, P<0.001). If Australia had adopted the UK sodium targets, this would have covered 9,927 unique products, resulting in a reduction in per capita sodium purchases by 110mg/d.

Conclusions: The Healthy Food Partnership reformulation program is estimated to result in a very small reduction to sodium purchases. There are opportunities to improve the program considerably through greater coverage and more stringent targets.

Hunger for Home Delivery: Cross-Sectional Analysis of The Nutritional Quality of Menu Items on an Online Food Delivery platform in Australia

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Special Interest Group: H. Policies and environments (SIG)

Purpose: Online food delivery (OFD) platforms capitalise on the accessibility of smartphone technology and are changing how consumers purchase food prepared outside of home. Young people dominate current usage and independent food outlets contribute a substantial proportion of outlets partnering with OFD platforms. However, the nutritional quality of these outlets' offerings and how OFD-related marketing tactics may affect consumer choice is understudied. This study evaluated the nutritional quality and marketing attributes of all menu items from the most popular independent takeaways available on a market-leading OFD platform.

Methods: The most popular food outlets from suburbs in NSW, Australia, with above-average populations of young people were investigated (identified by a previous study). Publicly available complete menus and marketing attributes from 202 independent takeaways were extracted via web scraping. Marketing attributes included a popularity cue (a category attracting greater visibility), price, offering as value bundle, use of image, nutritional information and dietary labelling. Menu items were classified into 38 novel food and beverage categories based on the Australian Dietary Guidelines. Categorical variables were analysed using Chi-squared and odds ratios. Continuous variables were analysed using Kruskal-Wallis tests.

Results/findings: Of 13841 menu items, 80.5% (11139/13841) were discretionary (foods high in saturated fat or added sugars, added salt or low in fibre). Discretionary menu items were more likely to be categorised as most popular (OR: 2.5, 95%CI 1.9–3.2), accompanied by an image (OR: 1.3, 95%CI 1.2–1.5), and offered as a value bundle (OR: 6.5, 95%CI 4.8–8.9). Few (<1%) of all menu items had nutritional information or dietary labelling. Two of the three discretionary food categories were more expensive than their healthier counterparts ($P < 0.02$).

Conclusions: The ubiquity of discretionary choices offered by independent takeaways highlights the need for their inclusion in public health policies such as point-of-sale menu labelling. Disparity in the use of marketing attributes across discretionary and healthier menu items suggests OFD platforms may favour unhealthier options, which warrants their consideration in public health policy.

National nutrition standards to reduce salt intake in public institutions: A systematic review

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Special Interest Group: H. Policies and environments (SIG)

Purpose: Policies that aim to improve population diets through creating healthy food environments offer an important opportunity to reduce the burden of disease attributable to unhealthy diets. Healthy food environments can be created in public institutions by implementing nutrition standards, a set of food- or nutrient-based criteria applied to the procurement, preparation, provision or sale of foods. This systematic review aimed to identify countries with national nutrition standards to reduce salt intake in public institutions, and to describe and summarise these initiatives.

Methods: National salt reduction initiatives up to 2019 were identified through systematic search of peer-reviewed and grey literature, supplemented with verified information from salt reduction experts and country program leaders. Subsequently, cited policy documents were retrieved through an online search. Studies/documents containing information on national nutrition standards to reduce salt intake in public institutions were included. Characteristics of each country's nutrition standards were extracted and summarised by region, country income level, institution type and approach to implementation, using a framework for monitoring foods in public institutions.

Results/findings: Sixty-one countries had nutrition standards to reduce salt intake in at least one public institution (schools, workplaces, hospitals, early-years settings, other educational settings and sport and recreation centres). Every identified country had nutrition standards in schools and almost half (26/61) had nutrition standards in more than one institution type. The majority were in Europe (31/61) and high-income countries (39/61). The total number of policies was 111. The most common strategy was applying both food- and nutrient-based standards (75/111), rather than either strategy alone. This was consistent across institution types but not across regions or income levels. More than half were mandatory (63/111), mostly in schools (41/63), Europe (33/63) high-income countries (35/63).

Conclusions: One-third of countries have nutrition standards to reduce salt intake in at least one public institution. In many countries, the opportunity exists to adapt current school nutrition standards to other types of public institutions to have greater impact on population diets. There is scope to develop standards and stimulate impact in most regions and particularly low- and lower-middle-income countries.

**O1.07 - Child and youth physical activity and sedentary behavior,
June 8, 2021**

Australian guidelines for children's physical activity and screen-time in Outside School Hours Care: results of the guideline development process and outcome

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Special Interest Group: F. Early care and education (SIG)

Purpose: Around the world, millions of children attend Outside School Hours Childcare (OSHC) (for example, up to 80% of Norwegian children, and 10% of Australian children). Yet, there is a lack of evidence-based guidance on appropriate physical activity and screen-time practices in OSHC. This study aimed to engage multidisciplinary stakeholders to formulate physical activity and screen-time guidelines for Australian OSHC.

Methods: A 4-round online Delphi survey was conducted. Australian and international stakeholders were invited, representing academia, the education sector, government, health professionals, OSHC staff and parents (n=110). Round one comprised open-ended items exploring physical activity, screen-time and sedentary behaviour in before and after school care, and vacation care settings. Subsequent rounds were based on stakeholder comments from previous rounds and sought consensus for inclusion in national guidelines. Consensus was set at 80% agreement. Statements reaching consensus were combined with evidence from two systematic/scoping reviews to develop the guidelines following the GRADE process.

Results/findings: Sixty-seven stakeholders participated representing all target stakeholder groups. 48 statements achieved consensus for inclusion. These statements related to offering a variety of physical activities (free play, playground, sports equipment and facilitated games) and limiting screen-time availability. Consensus was reached on the need to restrict recreational screen-time. Some participants believed screen time should not be routinely offered in OSHC, however this did not reach consensus. The resulting guidelines were framed at the OSHC service-level, rather than child-level, in order to provide OSHC services with clear guidance for scheduling of physical activity and screen-time. The physical activity guidelines assumed a 3:1 ratio, i.e. that children will be physically active for approximately one third of scheduled physical activity opportunity. The final guidelines recommend: before school: > 45 minutes of scheduled physical activity and <30 minutes screen-time; after school >90 minutes of scheduled physical activity and <60 minutes of screen-time; vacation care >180 minutes of scheduled physical activity and <120 minutes of screen-time.

Conclusions: This novel research used expert and stakeholder consultation to underpin the development of the Australian physical activity and screen-time guidelines for OSHC. Future research will seek OSHC sector feedback on the guidelines, and identify translation pathways.

Children's journeys to and from school: An analysis of travel modes, environments and eating behaviours using wearable cameras

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Special Interest Group: G. Children and families (SIG)

Purpose: The nature of children's journeys to and from school has public health relevance for physical activity and healthy eating. By passively capturing images of children's surroundings, wearable cameras have the potential to not only identify travel modes, but also environmental factors that influence health e.g. food marketing. We aimed to determine the nature of children's journeys to and from school, including time spent in active and motorized travel, destinations visited and food purchase/consumption, using data from the Kids'Cam wearable camera project.

Methods: The sample for this cross-sectional observational study included 153 Year 8 children aged 11-13 years in the Wellington region of New Zealand. Each child wore a wearable camera around their neck for two school days, capturing images of their surroundings every 7 seconds. Following piloting and reliability testing, images were coded for active and motorised travel time, destinations visited on-route (e.g. food outlets, recreation/sport) and food purchase/consumption. Mean active and passive travel time were calculated using negative binomial regression.

Results: Children's journeys, on average, took 19.4 minutes (active travel: 6.8 minutes; passive travel: 7.8 minutes; time spent 'stopped': 4.3 minutes). Journeys were variable, containing an average of 2.8 legs (e.g. walk-bus-walk). The most common destinations at which children stopped were unhealthy food outlets (e.g. convenience stores) (40.7% of total). Children with higher active travel time visited more food outlets and purchased more food/beverages than those using motorised transport.

Conclusions: Wearable cameras are a promising tool for contextualising children's journeys to and from school. Our findings highlight the complexity of school journeys, many of which do not fit a simple classification as 'active' or 'passive'. The link between active travel and unhealthy food exposure emphasizes the need to limit food marketing and unhealthy food availability near schools, as a means to create environments that support both active travel and healthy eating.

Can an accelerometer distinguish between sitting in a car and other forms of sitting?

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Special Interest Group: G. Children and families (SIG)

Background: The application of machine-learning to classify activity behaviours is becoming more prominent. The ability to distinguish sitting in a car vs. other forms of sitting is important to better understand travel behaviours and evaluate active transport-focused interventions. This study examined if a dual accelerometer system and machine learning methods can differentiate sedentary behaviours during travel and non-travel time in children.

Methods: 13 children wore two Axivity AX3 accelerometers (set to record at 100 HZ, with $\pm 8G$ of bandwidth); one to their thigh, and one to their lower back; alongside an automated clip camera (clipped to the lapel) that captures video of their free-living environment (criterion measure of sedentary activity). Participants were then taken on a car drive for 10 to 15 mins and were also encouraged to complete sedentary activities (e.g., sitting on a chair) at their private residence within a timeframe of 2 hours. Various signal features were extracted from raw accelerometer data, which were used to train a random forest machine learning classifier. The model was evaluated using leave-one-out cross-validation.

Results: In total, 9.1 hours of sitting were recorded, of which 2.1 hours were 'sitting in a car'. The random forest model achieved a sensitivity of 57%, specificity of 83.4% (Kappa = 0.3213), and a precision of 35.3% in distinguishing 'sitting in a car' from other forms of sitting.

Conclusions: This study demonstrated that a dual accelerometer system cannot effectively distinguish sedentary behaviours accumulated during travel and non-travel time. Future studies may have to rely on an additional GPS device to provide contextual information for sedentary behaviors.

Paternal and maternal support on children's weekday and weekend moderate-to-vigorous physical activity: a cross-sectional study

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Special Interest Group: G. Children and families (SIG)

Purpose: Most studies about parental support behaviors for physical activity (PA) on children's moderate-to-vigorous intensity physical activity (MVPA) were conducted in developed countries, and most focused on mother's or parent's (with no differentiation between father's or mother's) support behaviors. Besides, children's MVPA time interval was not differentiated adequately. This paper aimed at investigating the associations between paternal and maternal support behaviors for PA, and children's MVPA on weekdays, weekends and the whole week in China.

Methods: Cross-sectional data of 517 father-child dyads and 1,422 mother-child dyads were analyzed. Children's MVPA time was recorded using consecutive 7-day PA diary. MVPA time on weekdays, weekends and the whole week were further calculated, respectively. Father or mother completed a questionnaire on their support behaviors for children's PA. Multivariate logistic regression was conducted to investigate the independent effect of paternal and maternal support behaviors for PA on children's meeting MVPA recommendation on weekdays, weekends and the whole week, respectively.

Results: The proportion of children's meeting MVPA recommendation on weekends (37.8%) was significantly lower than that on weekdays (62.8%). Higher paternal (OR[95%CI]:1.098[1.009,1.195]) and maternal (OR[95%CI]:1.076[1.021,1.134]) total scores of support behaviors for PA were associated with children's higher odds of meeting MVPA recommendation on weekends, after controlling for covariates. Paternal sharing PA knowledge with child was significantly associated with children's meeting MVPA recommendation on weekends (OR[95%CI]:1.319[1.055,1.649]), and marginally associated with children's meeting MVPA recommendation on weekdays (OR[95%CI]:1.220[0.974,1.528], P=0.084) and on the whole week (OR[95%CI]:1.218[0.977,1.519], P=0.080). Maternal reserving PA time for child was associated with children's higher likelihood of meeting MVPA recommendation on weekdays (OR[95%CI]:1.160[1.025,1.313]), weekends (OR[95%CI]:1.241[1.097,1.403]) and the whole week (OR[95%CI]:1.214[1.076,1.369]), respectively.

Conclusions: On weekends, paternal and maternal total support behaviors for PA deserves more practices for promoting children's MVPA. To promote children's MVPA on weekdays, weekends and the whole week, father's sharing PA knowledge with child and mother's reserving PA time for child are recommended. Longitudinal researches are needed to verify the findings.

What might influence Indonesian adolescents to change their physical activity and sedentary behaviour during the COVID-19 pandemic? A qualitative study based on parents' perspectives

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Special Interest Group: G. Children and families (SIG)

Purpose: Socio-behavioural adaptations during the COVID-19 pandemic may have significantly affected young people's lifestyle. Investigations on the reasons for changes in adolescents' physical activity and sedentary behaviour during the pandemic are not yet available. This study aimed to explore underlying reasons affecting changes in physical activity and sedentary behaviour in Indonesian adolescents during the COVID-19 pandemic based on parents' perspectives.

Methods: This qualitative study employed a reflexive thematic analysis approach. We recruited participants from the Yogyakarta region of Indonesia by using purposive and snowball sampling. Twenty mothers agreed to participate in the study. We collected data by using interviews and an online sociodemographic questionnaire. Semi-structured one-on-one interviews were conducted by the lead author primarily by mobile phone (n=17). Three participants asked to do face-to-face interviews due to problems with telephone connections and convenience reasons. Interviews were audio-recorded, transcribed verbatim and anonymised. All data were imported into NVivo software for analysis.

Results: The interviews lasted between 38 and 113 minutes (M duration = 65 min). Participants' age ranged between 36-54 years (M = 42.6 years). Participants' children ranged in age from 12 to 15 years (M=13.7 years, female: 9, male: 11). From the data analysis, we generated two themes related to changes in physical activity during the COVID-19 pandemic: 1) self-determination to do physical activity, and 2) the presence of supports from others. Meanwhile, three inter-related themes related to changes in sedentary behaviour: 1) increased demands for using screen-based devices, 2) increased reliance on screen-based devices, and 3) support system in the family.

Conclusions: This study provides new insights on underlying factors affecting changes in adolescents' physical activity and sedentary behaviour during the COVID-19 pandemic. Overall, adolescents became less active and more reliant on screen-based devices, either for educational or recreational purposes. Self-determination seems to be the most significant factor for adolescents to keep doing physical activity during the pandemic. WhatsApp, Instagram, and YouTube were the most popular social media among adolescents, suggesting future studies and policymakers to take into account these findings when designing interventions and policies.

Keywords: pandemic, health, youth, young people, exercise, screen time

**O1.08 - Physical activity and healthy eating in childcare,
June 8, 2021**

Population-based reference values for total physical activity and energetic play while attending childcare

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Special Interest Group: F. Early care and education (SIG)

Purpose: Public health authorities recommend children ≤ 5 y accumulate 180 min/d in a variety of physical activity (PA) types and intensities. Given the large proportion of children attending childcare, quantitative guidelines for PA accumulated while in care are needed. The current study analysed accelerometer data from four Australian studies to establish population-based reference values for PA while attending childcare.

Methods: 3,374 accelerometer records were available, providing 11,404 childcare monitoring days for analysis. Of this number, 3,893 monitoring days from 2,185 children met the strict inclusion criteria (aged 2 to 5 y; childcare attendance ≥ 4 and < 12 hrs; accelerometer wear time $\geq 95\%$ of attendance). Raw accelerometer signal was processed into PA metrics using a random forest (RF) PA classification algorithm for children ≤ 5 y (Ahmadi et al., 2020). The RF uses 20 features in the vector magnitude (VM) of the tri-axial acceleration signal to classify movement as: sedentary (SED), light-intensity activities and games (L_ACT_G), walking (WALK), running (RUN), or moderate-to-vigorous activities and games (MV_ACT_G). Non-wear periods were defined as 30 consecutive mins in which the SD for the VM was < 13 mg. Total PA (TPA) was the sum of L_ACT_G, WALK, RUN, and MV_ACT_G. Energetic Play (EP) was the sum of WALK, RUN, and MV_ACT_G. TPA and EP values were standardised to an 8-hr day. Percentiles were calculated after transforming TPA and EP values to a normal distribution using the bestNormalize package in R.

Results: Boys percentiles for TPA were: 200 (5th), 252 (25th), 292 (50th), 326 (75th), and 377 (95th) min/d. In girls, the corresponding values were 182, 234, 276, 314, and 363 min/d. Boys percentiles for EP were: 8 (5th), 15 (25th), 25 (50th), 37 (75th), and 65 (95th) min/d. In girls, the corresponding values were 6, 12, 20, 30, and 51 min/d.

Conclusions: On an average childcare day, Australian children accumulate 276 to 292 min of TPA and 20 to 25 min of EP. Nearly all children meet the 180 min TPA recommendation if they attend childcare for a full day, but only a small percentage meet the daily guideline for energetic play.

Meeting Australian 24-Hour Movement Guidelines is associated with better pre-schooler social-emotional development

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Special Interest Group: F. Early care and education (SIG)

Purpose: Australian 24-hour movement guidelines for the early years provide recommendations on daily physical activity, sedentary leisure screen time and sleep, for children 0-5 years. We used a large representative sample to examine the association between meeting 24-hour movement guidelines and pre-schooler social-emotional development.

Methods: PLAYCE study data were collected for 1368 children 2-5 years from 122 Perth, Western Australian childcare centres. Centres were recruited based on size and socio-economic status. Physical activity was assessed using 7 day accelerometry. Parent-report screen time and sleep were determined using established reliable items. The Strengths and Difficulties Questionnaire was used to measure social-emotional development.

Results/findings: Only 7.7% of pre-schoolers met all three 24-hour movement guidelines and 7.1% met none. Meeting screen time guidelines (compared with none) was associated with lower mean emotional difficulties ($p=0.013$), conduct problems ($p=0.026$), hyperactivity ($p=0.029$) and peer problems ($p=0.046$) scores as well as lower overall difficulties score (adjusted mean difference -2.39, $p<0.001$). Meeting the sleep guideline vs. none ($p=0.029$), as well as meeting all three guidelines vs. none ($p=0.033$) was associated with better overall social-emotional development.

Conclusions: Pre-schoolers who met screen time guidelines had on average a lower total difficulties score of 2.4. These findings are important considering existing population level data shows that the odds of children developing a clinically significant mental health disorder increases by 14-28% for each one point increase in the total difficulties score. Our findings provide stronger evidence that meeting 24-hour movement guidelines, particularly screen time guidelines, supports young children's social-emotional development. Effective scalable integrated intervention strategies targeting multiple movement behaviours are required to support all aspects of young children's health and development.

Where are preschool children active in childcare centres? A hot spot analysis based on accelerometer, GIS and GPS data

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Special Interest Group: F. Early care and education (SIG)

Purpose: Preschool children spend a significant amount of their time in the childcare centre environment, however studies of the childcare physical environmental influences on preschool children's physical activity behaviours are sparse and limited by the lack of use of device measured physical activity and objectively measured physical environment data. The use of device measured physical activity and spatial data can provide objective information on how spaces are used and the types of physical activity preschool children do in the childcare outdoor environment. This study aims to investigate where preschool children are most and least active in the childcare outdoor environment using device measured physical activity and objectively measured physical environment data.

Methods: Participants included 399 preschool children aged 2-5 years from 30 childcare centres taking part in the part in the Play Spaces & Environment for Children's Physical Activity (PLAYCE) Study in Perth, Western Australia. Participant wore an accelerometer (Actigraph GT3X) and a Global Positioning System (GPS) device (Qstarz Q-1000XT) for 7 days. Optimized hot-spot analysis was performed using ArcGISpro to identify the statistically significant spatial clusters of GPS points with high or low physical activity levels in every childcare centre.

Results: Clusters of hot spots were found to be gathered in childcare open areas (24 out of 30 childcare centres) and sometimes also found in their adjacent outdoor play areas if children can freely move between these areas. Overall, there was no significant difference in preschool children's physical activity levels by sex or childcare centre socioeconomic status.

Conclusions: The amount of free running space in nature play, sand play and dramatic play areas and their connection to the open areas was important for facilitating active play in preschool children. These findings provide preliminary evidence to help identify where preschool children are physically active or inactive in the childcare environment, and will help to inform the planning, design, building of childcare centres that are sensitive to children's needs.

Creating responsive infant and young child feeding supportive environments in Early Childhood Education and care in Australia

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Special Interest Group: F. Early care and education (SIG)

Purpose Essential to optimal child health and development in early childhood education and care (ECEC) is responsive infant and young child feeding. Research investigated the environments that supported responsive infant feeding and views of Australian educators on responsive feeding implementation.

Methods Long day care and family day care services (n=19) in the state of Queensland from metropolitan/regional and varied socio-economic areas participated in the study. This included 124 educators contributing through professional conversations, semi-structured interviews with service leaders and environmental audits utilising images and the NAP SAAC survey tool. Analysis was guided by the Framework method, incorporating both inductive thematic, and deductive analysis utilising Bronfenbrenner's Ecological model.

Results Three main themes were identified through qualitative analysis 1. Educator knowledge, efficacy and agency, 2. Environment and 3. Monitoring/surveillance as being significant factors for collective supportive responsive infant feeding, vital to agency. Fundamentally this illuminates the crucial need for supporting service leadership, knowledge of educators for infant and young child feeding and collective efficacy to overcome system barriers to enable supportive ECEC environments for responsive feeding.

Conclusions Research outcomes describe the necessity for national visibility of infant and young child feeding policies and policy leadership and training on responsive feeding. Results highlight the importance of developing educator efficacy around parents to support responsive feeding impacting infant and young child agency.

Feasibility of a web-based intervention to improve the implementation of healthy eating practices in childcare

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Special Interest Group: F. Early care and education (SIG)

Purpose: Web-based modalities provide a potentially effective and less costly approach to implementing healthy eating interventions at scale. This study sought to collect feasibility and pilot data to inform the design of a web-based intervention to improve the implementation of healthy eating practices within the childcare setting. Specifically, the aim of this pilot implementation trial was to: (1) Collect data to inform processes to undertake a fully-powered implementation trial; (2) Examine the uptake of the implementation strategies; (3) Examine the acceptability of intervention and implementation strategies; and (4) Understand the cost to deliver the implementation support strategies.

Methods: A 6-month pilot implementation trial employing a cluster randomised controlled trial design was conducted in childcare centres within New South Wales, Australia. Intervention centres received implementation strategies embedded within a web-based program and provided by health promotion officers. Feasibility of the intervention was assessed through study consent rates and completion of data collection. Uptake of the implementation strategies were captured via analytics and internal records. Acceptability of the intervention and implementation strategies were assessed through surveys with centre staff. Cost to deliver implementation strategies was assessed via internal records.

Results: A 47% consent rate was achieved. Twenty-two centres (100%) consented to participate in all data collection components. All intervention centres (n=11) received audit with feedback and developed a formal implementation blueprint via the web-based program. All intervention centres received the educational outreach visit and 91% received a support call (n=10). One hundred percent of centre managers (n=11) reported the web-based program as being an acceptable method for assessing implementation of healthy eating practices. All implementation strategies were deemed highly acceptable by 100% of centre managers. The total cost to deliver the implementation strategies was \$1351 (\$122 per centre).

Conclusions: As this study is one of few examining the potential impact of a web-based intervention within the childcare setting, a fully-powered implementation trial is warranted to establish the true effects and examine the impact of the intervention on the implementation of healthy eating practices at scale.

**O1.09 - Advances in nutrition research from infancy to adolescence,
June 8, 2021**

Association between breastfeeding and sleep patterns in infants and preschool children

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Special Interest Group: G. Children and families (SIG)

Purpose: Sleep in early childhood is important for child development. While most studies reported unfavourable short-term effects of breastfeeding on infant sleep-wake behaviours that potentially attenuate over time, findings remained inconsistent. This study investigates the associations between breastfeeding and longitudinal day-, night- and total sleep trajectories, and sleep-wake behaviours in healthy infants and preschool children.

Methods: In a prospective cohort study, 654 caregivers of fully-breastfed (n = 158), partially-breastfed (n = 208) and formula-fed (n = 288) naturally-conceived term born singletons, had completed the Brief Infant Sleep Questionnaire (BISQ) (3, 6, 9, 12, 18 and 24 months) and/or Children's Sleep Habits Questionnaire (CSHQ) (54 months). Group-based multi-trajectory analyses derived four day- (n = 243), three night- (n = 248) and/or four total- (n = 241) sleep trajectories, with each differing in length of sleep duration (short/moderate/long) and variability (variable/consistent). Infant sleep-wake behaviours (day/night/total sleep durations, and duration/number of night awakenings) were also assessed for associations with breastfeeding status from 3 to 24 months.

Results: After adjusting for potential covariates, formula-fed infants were significantly more likely to exhibit short variable night- [OR=4.43 (95% CI 1.86 to 10.54)] and total sleep trajectories [OR=6.51 (95% CI 2.47 to 17.17)] and less likely to exhibit long consistent night-[OR=0.36 (95% CI 0.15 to 0.85)] and total sleep trajectories [OR=0.32 (95% CI 0.13 to 0.80)], compared to fully-breastfed infants. Partially-breastfed infants did not differ from fully-breastfed infants for both night- and total sleep trajectories. No significant differences were found between all three breastfeeding groups for day sleep trajectories. Fully-breastfed infants have longer night- (6, 9, 12 and 24 months), day- (3 months) and total- (3 and 9 months) sleep durations, than formula-fed infants, albeit greater number of night awakenings (from 3 to 12 months).

Conclusions: Despite more night awakenings, fully-breastfed infants have overall longer sleep duration and more likely to develop long consistent (and less likely to develop short variable) night- and total sleep trajectories, compared to fully formula-fed infants.

The association between maternal fat-soluble vitamins during pregnancy and abnormal infant birth weight: a retrospective cohort in China

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Special Interest Group: G. Children and families (SIG)

Purpose: Fat-soluble vitamins during pregnancy are important for fetal growth and development. This study was conducted to explore the association between maternal serum vitamin A, E and D status during pregnancy and infant birth weight. Relevant studies are rare in China, and the existing ones were poorly designed, e.g. having a small sample size, measuring vitamins at partum only, not matching between observation and control groups, not controlling for covariates, not detailing the study design. The present study was a large-scale retrospective cohort among the Chinese population.

Methods: A total of 19 640 women with singleton deliveries were included. Data were collected by the hospital electronic information system. Maternal serum vitamin A, E and D concentrations were measured during pregnancy. Logistic regression was performed to estimate the association between the vitamin status and low birth weight (LBW) or macrosomia.

Results: The prevalence of LBW and macrosomia in the birth cohort was 2.6% and 8.2%, respectively. Women with excessive vitamin E were more likely to have macrosomia (OR 1.30, 95 % CI 1.07, 1.59) compared with adequate concentration. When focusing on Z scores, there was a positive association between vitamin E and macrosomia in the first (OR 1.07, 95 % CI 1.00, 1.14), second (OR 1.27, 95 % CI 1.11, 1.46) and third (OR 1.28, 95 % CI 1.06, 1.54) trimesters; vitamin A was positively associated with LBW in the first (OR 1.14, 95 % CI 1.01, 1.29), second (OR 1.31, 95 % CI 1.05, 1.63) and third (OR 2.00, 95 % CI 1.45, 2.74) trimesters and negatively associated with macrosomia in the second (OR 0.79, 95 % CI 0.70, 0.89) and third (OR 0.77, 95 % CI 0.62, 0.95) trimesters.

Conclusions: The study identified that high concentrations of vitamin E are associated with macrosomia. Maintaining a moderate concentration of vitamin A during pregnancy might be beneficial to achieve optimal birth weight. Further studies to explore the mechanism of above associations are warranted.

Development of Core Outcome Sets for Early intervention trials to Prevent Obesity in Children (COS-EPOCH)

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Special Interest Group: G. Children and families (SIG)

Purpose: Core Outcome Sets (COS) are agreed minimum sets of outcomes recommended for measurement in studies for specific conditions or areas of health. COS development aims to improve the consistency, comparability and transparency of study findings and can help to reduce research waste. Few COS for public health interventions currently exist and there are no published COS that can be applied to obesity prevention interventions in children aged from birth to five years that include outcomes for multiple behaviour domains (e.g. food intake, movement, sleep). This study describes the development of a COS for randomised controlled trials (RCTs) evaluating lifestyle interventions for the prevention of obesity in 0-5 year olds (COS-EPOCH), and highlights some of the challenges faced in COS development.

Methods: Overseen by an international Steering Group, the COS development process follows the Core Outcome Set-STAndards for Development recommendations. Development consists of three stages: (i) a scoping review of early childhood obesity prevention RCTs, identifying potential outcomes and measurement instruments; (ii) a modified Delphi study to determine core outcomes by relevant stakeholder group, followed by a consensus meeting to finalise core outcome recommendations; and, (iii) determination of recommended measurement instruments.

Results/findings: Scoping review identified 170 relevant studies, with preliminary findings demonstrating there are a large number of outcomes currently collected in early childhood obesity prevention RCTs, and a broad range of outcome measurement instruments and methodologies employed. This high level of variation between studies makes evidence synthesis challenging, and further highlights the need for an agreed set of core outcomes. Delphi study development and recruitment is underway. Challenges in the development of the COS-EPOCH include the multiplicity of potential outcomes for inclusion, and the heterogeneity in completeness of study reporting in trial registries and the literature.

Conclusions: The development of the COS-EPOCH will provide trialists with standardised sets of outcomes spanning the early childhood timeframe that takes into account this unique period of child development and incorporates multiple risk factors targeted in interventions. Effective dissemination of the COS-EPOCH will play a critical role in its future uptake.

Improving primary school children's nutrition knowledge using an integrative nutrition and mathematics program: a pilot randomised controlled trial

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Special Interest Group: G. Children and families (SIG)

Purpose: Nutrition education in schools plays an essential role in child health and wellbeing, with research showing such programs can improve child dietary knowledge and behaviours. Although teachers are key to nutrition education delivery, they report that a lack of time often hinders their ability to teach nutrition as a stand-alone subject. An education program that integrates nutrition with core curricular subjects may help address this barrier. This study aimed to examine the impact of a teaching unit integrating nutrition with mathematics on child nutrition knowledge (CUPS: Cross-curricular Unit on Portion Size).

Methods: Four primary schools participated in the CUPS randomised controlled trial, conducted across one to four weeks (n=69 students in Year 3/4). Students randomly allocated by class groups to the intervention arm (n=44) received six lessons on food groups, portion/serve size, volume and capacity involving experiential learning with mathematics cubes and food models. Students in the wait-list control group (n=25) continued usual lessons. Nutrition knowledge was determined using a survey (CNK-AU), administered pre-intervention, immediately post-intervention and 4 weeks after intervention completion. Linear mixed models were used to determine the impact of treatment group, time and the group-by-time as fixed effects.

Results/findings: Linear mixed models accounting for clustering at the class level displayed a significant improvement in overall nutrition knowledge scores for the CUPS group compared to the control condition at both post-intervention time points (P<.01). Adjusted difference in change for nutrition knowledge scores from baseline to post-intervention and baseline to 4 weeks post-intervention were 4.84 (95% CI [2.35-7.32]) and 3.40 (95% CI [0.88-5.95]) respectively. Students scored particularly better on questions about healthy choices and recommended serve sizes.

Conclusions: The CUPS program uses an integrative approach to teach primary school children about healthy eating, food portions and serve sizes while aligning with the mathematics curriculum. Findings provide evidence for effectiveness of this teaching strategy to improve child nutrition knowledge. Future cross-curricular nutrition education interventions should investigate long-term effects within a larger sample to fully explore effectiveness.

Making sense of adolescent-targeted social media food marketing: a qualitative study of expert views on key definitions, priorities and challenges

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Special Interest Group: G. Children and families (SIG)

Traditional food marketing stimulates adolescents' consumption of energy-dense, nutrient-poor foods. These dietary behaviors may track into adulthood and lead to weight gain, obesity, and related non-communicable diseases. While social media use in adolescents has proliferated, little is known about the content of food marketing within these platforms, and how this impacts adolescents' dietary behaviours. This paper aimed to obtain expert insights on factors involved in the association between social media food marketing (SMFM) and adolescent dietary behaviours, and to explore their views on key priorities, challenges and strategies for future SMFM research and policies.

One-on-one semi-structured interviews (n=17) were conducted with experts in the fields of public health (policy), nutrition science, social media marketing, adolescent medicine, clinical psychology, behavioural sciences, communication, food industry, social influencing, and social marketing.

The experts' collective responses identified that the line between food content posted by social media users and food companies is blurred and social media food marketing is subject to multiple interpretations. Adolescents' processing of SMFM may be mostly implicit, involving social comparisons, emotional engagement, and attaching symbolic meanings to the promoted foods. Moderating factors potentially influencing adolescents' response to SMFM messages include adolescent-specific and SMFM-specific factors. The first largely refers to the unique developmental phase of adolescence, e.g. adolescents are typically more impulsive and more sensitive to peer behaviors, and they are still developing their own identity, among others. The latter includes characteristics that make SMFM messages particularly effective in targeting adolescents, e.g. they are engaging, interactive, personalized, and they show other's engagement, among others. Experts agreed there is limited scientific evidence on adolescent-targeted SMFM, and expressed concern that there are no current regulations in place to protect adolescents from unhealthy SMFM, as adolescents are active social media users and their cognitive abilities make them vulnerable to implicit marketing tactics. Adolescent-targeted SMFM content should be controlled by either encouraging healthy food marketing or limiting junk food marketing.

Creating clear and universal SMFM definitions, and prioritizing both quantitative research on SMFM exposure and qualitative research to obtain adolescents' perspectives, are all crucial in advocating for regulatory restrictions on adolescent-targeted SMFM content.

Adolescents' appreciation and awareness of food marketing content on social media

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Special Interest Group: G. Children and families (SIG)

Adolescent-targeted food marketing mostly concerns energy-dense, nutrient-poor foods, encouraging increased consumption of these foods. With the rise of social media marketing, strategies to market foods to adolescents have transformed into more advanced and implicit tactics. While adolescents' social media use has increased rapidly over time, leading to over 9000 social media food marketing (SMFM) exposures annually, to date no research has examined to what extent adolescents are aware of or appreciate SMFM content. This study aimed to provide insight into adolescents' awareness and appreciation of SMFM.

Semi-structured online one-on-one interviews with 16 Dutch adolescents (mean age 14.5 years) were conducted, in which SMFM instances from Instagram, Snapchat, TikTok and Youtube were extensively discussed. Interview transcripts were coded and thematically analysed.

The results showed that participants used specific criteria for recognising social media content as food advertising. Specifically, when food content was posted by a food brand account, they considered it food advertisement, but when it was posted by friends they did not. When food content was posted by a famous social media influencer, recognition of the advertisement differed. Participants' recognition of food advertising was variable for food content disclosing commercial intent. With regard to appreciation, participants had different perspectives on the reliability of the source (brand, celebrity or friend) and based their preference on this. Participants generally preferred the marketing of non-core foods.

This study contributes to a relatively unexplored research area. Adolescents' awareness and appreciation of SMFM is impacted by the level of integration of SMFM into social media content, with the source of food content and the use of disclosures as major influential factors. Since adolescents mostly prefer non-core food content on social media, this may have significant implications for their food consumption and health. Hence, there is an urgent need for strategies to help adolescents become more resilient to SMFM content. Moreover, it is recommended that future research complements the current findings by exploring more objective measures of adolescents' awareness or recognition of SMFM, i.e. through experimental study designs.

**O1.10 - Design and evaluation of digital interventions for nutrition and
physical activity,
June 8, 2021**

Co-Design in mHealth Systems Development: A Qualitative Study with Multidisciplinary Experts

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Special Interest Group: D. e- & mHealth (SIG)

Background: The proliferation of mobile devices has enabled new ways of delivering health services through mobile health systems. Researchers and practitioners have emphasized that the design of such systems is a complex endeavor with various pitfalls, including limited stakeholder involvement in design processes and integration into existing system landscapes. Co-design is an approach to address these pitfalls. Despite a rich body of literature on co-design methodologies, limited research exists to guide the co-design of mHealth systems.

Objective: The objectives were to (1) contextualize an existing co-design framework to mHealth applications and (2) derive guidelines to address common challenges of co-designing mHealth systems.

Methods: This was an exploratory qualitative study consisting of 16 semi-structured interviews with co-design method experts (8) and mHealth system developers (8). Data were analyzed using thematic analysis.

Results: The contextualized framework captures important considerations of the mHealth context, including dedicated prototyping and implementation phases. Additionally, seven guidelines were developed: (1) specificity of targeted mHealth context, (2) immersion in mHealth context, (3) health behavior change, (4) co-design facilitators, (5) post-design advocates, (6) health-specific evaluation criteria, and (7) usage data and contextual research to understand impact.

Conclusions: System designers encounter unique challenges when engaging in mHealth development. The contextualized framework and guidelines presented will serve as a shared frame of reference to facilitate interdisciplinary collaboration at the nexus of information technology and health research.

#SupportLocal: how online food delivery services leveraged the COVID-19 pandemic to promote food and beverages on Instagram

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Special Interest Group: D. e- & mHealth (SIG)

Purpose: The COVID-19 pandemic has exacerbated the demand for online food delivery services (OFD's) which enable delivery of take-away and restaurant foods/drinks from kitchen to doorstep. Given the vast majority of discretionary or 'junk' foods available on these apps, OFD's pose a significant challenge to public health. Instagram, plays a pivotal role in the promotion of food outlets on OFD platforms and potentially influence consumers purchasing behaviours. The aim of this study was to explore the marketing strategies employed by the top 3 OFD's Instagram accounts in 3 countries during the COVID-19 pandemic and a period pre-pandemic.

Methods: Publicly available data was extracted for the top 3 OFD's Instagram accounts for Australia, UK and USA from March-May 2019 and 2020. Food/beverage items from posts were classified as discretionary or core according to the Australian Dietary Guidelines. Marketing strategies were coded using an existing framework from published studies, with 15 marketing strategies listed. Posts referring to COVID-19 were coded under four marketing strategies (developed by the research team): i) appropriating frontline workers ii) combatting the pandemic iii) selling social distancing iv) accelerating digitalisation.

Results/findings: In total, 618 food/beverage items were shown, of which 68% (420/618) were classified as discretionary foods. In 2020, most used marketing strategies were links (252/386, 68%), product imagery (unbranded) (179, 49%) and branding elements (175/386, 45%). In 2019, the most used were product imagery (unbranded) (137/195, 70%), links (111/195, 57%) and sponsorships or partnerships (58/195, 30%). The most common COVID-19 marketing strategy was combatting the pandemic (76/123, 62%), selling social distancing (53/123, 43%), appropriating frontline workers (34/123, 28%) and accelerating digitalisation (32/123, 26%).

Conclusions: Marketing strategies including branding elements, product imagery, links and sponsorships/partnerships are highly used by OFD's to promote their services on Instagram. Following the COVID-19 pandemic, OFD's adapted their marketing - mostly creating content around "combatting the pandemic". As discretionary foods are heavily promoted on Instagram, there is a need for policy action to counter the influence these platforms have on health behaviours.

Barriers and Enablers to Adoption of Digital Health Interventions to Support the Implementation of Dietary Guidelines in Early Childhood Education and Care

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Special Interest Group: D. e- & mHealth (SIG)

Purpose: Few Australian childcare centres provide foods consistent with sector dietary guidelines. Digital health technologies are a promising medium to improve the implementation of evidence-based guidelines in the setting. Despite being widely accessible, the population-level impact of such technologies has been limited due to the lack of adoption by end users. This study aimed to assess in a national sample of Australian childcare centres (1) intentions to adopt digital health interventions to support the implementation of dietary guidelines, (2) reported barriers and enablers to the adoption of digital health interventions in the setting, and (3) barriers and enablers associated with high intentions to adopt digital health interventions.

Methods: A cross-sectional telephone or online survey was undertaken with 407 childcare centres randomly sampled from a publicly available national register in 2018. Centre intentions to adopt new digital health interventions to support dietary guideline implementation in the sector were assessed, in addition to perceived individual, organizational, and contextual factors that may influence adoption based on seven subdomains within the non-adoption, abandonment, scale-up, spread, and sustainability (NASSS) of health and care technologies framework. A multiple-variable linear model was used to identify factors associated with high intentions to adopt digital health interventions.

Results: Findings indicate that 58.9% (229/389) of childcare centres have high intentions to adopt a digital health intervention to support guideline implementation. The changes needed in team interactions subdomain scored lowest, which is indicative of a potential barrier (mean 3.52, SD 1.30), with organization's capacity to innovate scoring highest, which is indicative of a potential enabler (mean 5.25, SD 1.00). The two NASSS subdomains of ease of the adoption decision ($P < .001$) and identifying work and individuals involved in implementation ($P = .001$) were significantly associated with high intentions to adopt digital health interventions.

Conclusions: A substantial proportion of Australian childcare centres have high intentions to adopt new digital health interventions to support dietary guideline implementation. Given evidence of the effectiveness of digital health interventions, these findings suggest that such an intervention may make an important contribution to improving public health nutrition in early childhood.

Who uses the Aim2Be app and how? Users' typologies and their impact on health-related outcomes

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Special Interest Group: D. e- & mHealth (SIG)

Purpose. Mobile health interventions offer a promising approach to promote health behaviours. This study aimed to: 1) identify patterns of use of Aim2Be (a health behaviors modification app); 2) explore predictors of users' typologies; and 3) evaluate changes in health-related outcomes across users' typologies.

Methods. App use data on 214 child-parent dyads (high, low, or no use of various behavioral, social and gamified features of Aim2Be) were used to identify users' typologies through Latent Class Analysis. Multinomial logistic regressions assessed the predictors of class membership. Mixed-effect models adjusted for covariates, evaluated 3-month changes in children's diet, physical activity, screen time and adiposity (zBMI scores) across classes.

Findings. Among children, 4 classes were identified: Actively engaged (17%); Partially engaged (27%); Dabblers (20%) and Unengaged (36%). Among parents, five classes were identified: Fully engaged (14%); Moderately engaged (14%); Information seekers (8%); Social readers (17%) and Unengaged (47%). Parents' classes were associated with children's classes: actively engaged children were more likely to have fully and moderately engaged parents, and unengaged children were more likely to have unengaged parents ($p < 0.01$). Actively engaged children were younger compared to dabblers and unengaged children ($p < 0.05$). Dabblers lived in higher income households compared to actively and partially engaged children ($p < 0.05$). Married parents were more likely to be fully engaged users as opposed to information seekers, social readers or unengaged parents ($p < 0.05$). Social readers were older than fully engaged and unengaged parents ($p < 0.05$). Finally, changes in children's sugar intakes and zBMI scores differed across classes. Actively and partially engaged children decreased their sugar consumption by 14g. while unengaged children increased their sugar consumption by 11g. over a 3-months period ($p = 0.04$). Children whose parents were fully or moderately engaged with Aim2Be decreased their zBMI scores by 0.3 units compared to children with unengaged parents whose zBMI scores increased by 0.1 units ($p = 0.03$).

Conclusions. A high use of the active or behavioral components of Aim2Be app by children and parents may support positive changes in health outcomes, as opposed to using mostly social and gamified components. Further efforts should focus on increasing Aim2Be adherence among participants.

S1.01 - International Physical Activity and Environment Research Network (IPEN) Adolescent Study: Protocol and tools, June 8, 2021

Chair: Erica Hinckson, Head of School, Auckland University of Technology

Discussant: James Sallis; UC San Diego

Purpose: To describe the protocol and tools used to assess the objective and perceived walkability of the built environment and discuss challenges and opportunities.

Rationale: Worldwide, adolescents' physical activity (PA) levels are declining with a small proportion meeting the PA recommendations. For PA to promote long-term physical and mental health and wellbeing, participation needs to become part of everyday life. Unfortunately, existing initiatives to increase participation in PA have resulted in only minor and short-term gains. Environments (physical, social, and policy) influence physical activity. The built environment can play a role in improving and maintaining engagement in PA, with associated health benefits, but international evidence is limited. The IPEN Adolescent multicounty study aims to advance the science of environmental correlates of physical activity, sedentary behaviour, and weight status, and inform policy changes and practice locally and internationally. Only international studies can provide the full variability of built environments and accurately estimate effect sizes between built environments and health-related outcomes.

The primary aim of IPEN Adolescent is to estimate strength, shape, and generalizability (across cities) of associations of objective (GIS-based) and reported measures of the community environment with accelerometer-measured minutes of moderate-to-vigorous physical activity (MVPA) and sedentary time, along with multiple reported physical activity indices in adolescents aged 11-19, from data collected according to a common protocol in 15 countries.

Objective: To share the latest results, discuss challenges and opportunities for ongoing international research, and how to inform policy and practice.

Format: Erica Hinckson (chair) will provide an overview of the IPEN Adolescent study. Kelli Cain will describe the research protocol and report on relevant results. Ester Cerin will present on the development and validation of internationally-comparable scoring of the Neighbourhood Environment Walkability Scale for Youth. Ana Queralt will report on the alternate method reliability of the Microscale Audit of Pedestrian Streetscapes, Global version (MAPS-Global), comparing on-street and online observation methods in five

countries. Jim Sallis (discussant) will discuss the opportunities, challenges, and next steps for the IPEN-Adolescent study.

Interaction: Delegates will be able to engage in a question and answer session and opportunities will be provided to consider issues from their own experience and practice.

The International Physical activity and Built Environment study of adolescents: IPEN Adolescent design, protocol and measures

Ms. Kelli Cain^{1,2}, Prof. Jo Salmon³, Ms. Terry Conway^{1,2}, Prof. Ester Cerin^{2,4}, Prof. Erica Hinckson⁵, Associate Professor Josef Mitás⁶, Prof. Jasper Schipperijn⁷, Prof. Lawrence D Frank^{8,9}, Dr. Ranjit Mohan Anjana¹⁰, Associate Professor Anthony Barnett², Jan Dygrýn⁶, Prof. Mohammed Zakiul Islam¹¹, Dr. Javier Monina-Garcia¹², Dr. Mika Moran^{13,14}, Prof. Wan Abdul Manan Wan Muda¹⁵, Dr. Adewale L Oyeyemi¹⁶, Prof. Rodrigo Reis^{17,18}, Maria Paula Santos¹⁹, Ms. Tanja Schmidt⁷, Prof. Grant M Schofield⁵, Prof. Anna Timperio³, Prof. Delfien Van Dyck²⁰, Prof. James F Sallis^{1,2}

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Special Interest Group: H. Policies and environments (SIG)

Purpose: Only international studies can provide the full variability of built environments and accurately estimate effect sizes of relations between contrasting environments and health-related outcomes. The aims of the International Physical Activity and Environment Study of Adolescents (IPEN Adolescent) are to estimate the strength, shape, and generalizability of associations of the community environment (geographic information systems (GIS)-based and self-reported) with physical activity and sedentary behavior (accelerometer-measured and self-reported) and weight status (normal/overweight/obese).

Methods: The IPEN Adolescent observational, cross-sectional, multi-country study involved recruiting adolescent participants (ages 11-19 yrs) and one parent/guardian from neighborhoods selected to ensure wide variations in walkability and socioeconomic status using common protocols and measures. Fifteen geographically, economically, and

culturally diverse countries, from six continents, participated: Australia, Bangladesh, Belgium, Brazil, Czech Republic, Denmark, Hong Kong SAR, India, Israel, Malaysia, New Zealand, Nigeria, Portugal, Spain and USA. Countries provided survey and accelerometer data (15 countries), GIS data (11), global positioning system data (10), and pedestrian environment audit data (8).

Results: A sample of $n=6,950$ (52.6% female; mean age=14.5, $SD=1.7$) adolescents provided survey data, $n=4,852$ had 4 or more 8+hour valid days of accelerometer data, and $n=5,473$ had GIS measures. Physical activity and sedentary behaviour were measured by waist-worn ActiGraph accelerometers and self-reports, and body mass index was used to categorise weight status.

Conclusions: The IPEN Adolescent study will use the results to advance the science of environmental correlates of physical activity, sedentary behavior, and weight status, with the ultimate goal to stimulate and guide actions to create more activity-supportive environments worldwide.

Reliability of streetscape audits comparing on-street and online observations using MAPS-Global: IPEN Adolescent study in 5 countries

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Special Interest Group: H. Policies and environments (SIG)

The present study was developed within the framework of the IPEN (International Physical Activity and the Environment Network) Adolescent project in five cities: Melbourne (Australia), Ghent (Belgium), Curitiba (Brazil), Hong Kong (China), and Valencia (Spain). The main aim was to assess inter-rater reliability of the Microscale Audit of Pedestrian Streetscapes, Global version (MAPS-Global), comparing on-street and online observation methods in five countries with varying levels of walkability. Data were collected along walking routes from residential starting points toward commercial clusters. Target locations were selected in each city using a geographically stratified sampling design to ensure representation of neighborhoods varying in walkability and socio-economic status. To select high -versus low-walkable neighborhoods, all cities used a GIS-derived macro-level walkability index based on net residential, intersection density, and mixed land use. In-person on the street and online using Google Streetview audits were carried out by two independent trained raters. The final sample included 349 routes, 1228 street segments, 799 crossings, and 16 cul-de-sacs. Inter-rater reliability analyses were performed using Kappa or ICC statistics. Overall mean assessment times were the same for on-street and online evaluations (22±12 minutes). Overall scores for each section (route, segment, crossing) showed good to excellent reliability (ICCs: 0.813, 0.929 and 0.885, respectively). The MAPS-Global overall grand score had similar mean values for the on-street and online raters and demonstrated good to excellent reliability (ICC: 0.861). Considering good inter-rater reliability, MAPS-Global is a feasible and reliable instrument that can be used both on-street and online to analyze microscale environmental characteristics in diverse urban settings.

Development and validation of the Neighborhood Environment Walkability Scale for Youth across six continents

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Special Interest Group: H. Policies and environments (SIG)

Purpose: The IPEN (International Physical Activity and Environment Network) Adolescent study was conducted using common study protocols to document the associations of perceived neighborhood environment attributes with adolescents' physical activity and overweight/obesity across 15 countries. As countries did not use identical versions of the Neighborhood Environment Walkability Scale for Youth (NEWS-Y) to measure perceived neighborhood environment attributes, we developed a measurement model and scoring protocol for NEWS-Y items common to all IPEN Adolescent countries (NEWS-Y-IPEN). We also examined the construct validity of the NEWS-Y-IPEN subscales in relation to neighborhood-level socio-economic status and walkability.

Methods: Adolescents and one of their parents (N = 5,714 dyads) were recruited from neighborhoods varying in walkability and socio-economic status. To measure perceived neighborhood environment, 14 countries administered the NEWS-Y to parents and one country to adolescents. Comparable country-specific measurement models of the NEWS-Y-IPEN were derived using confirmatory factor analysis. To examine the construct validity of NEWS-Y-IPEN subscales, we estimated their associations with neighborhood-level walkability and socio-economic status.

Results: Country-specific measurement models of the factor-analyzable NEWS-Y-IPEN items provided acceptable levels of fit to the data and shared the same factorial structure with five latent factors: Accessibility and walking facilities;

Traffic safety; Pedestrian infrastructure and safety; Safety from crime; and Aesthetics. Associations between NEWS-Y-IPEN subscales and neighborhood-level walkability and socio-economic status provided strong evidence of construct validity. Our study suggests that the NEWS-Y-IPEN possesses good factorial and construct validity.

Conclusions: Future studies employing NEWS-Y-IPEN should use the proposed scoring protocol to facilitate cross-study comparisons and interpretation of findings.

S1.02 - ¡Haz Espacio para Papi! (Make Room for Daddy!): Child and family physical activity program design, measurement, and outcomes, June 8, 2021

Chair/Discussant: M Renée Umstattd Meyer, Associate Dean for Research, Baylor University

Purpose: This symposium will describe an innovative physical activity (PA) curriculum developed for a father-focused health program tailored for Mexican-heritage (MH) families, wrist-worn accelerometer measurement and machine learning processing methods, and PA-related outcomes from the ¡Haz Espacio para Papi! (Make Room for Daddy!) step-wedge randomized study. Rationale: PA is associated with numerous physical, social, and mental health benefits for both children and adults. However, many children and adults in the U.S. do not meet established PA guidelines. Unfortunately, families living in rural, low-income, limited-resource communities have fewer opportunities to engage in PA due to structural constraints. Particularly, MH families residing along the U.S.-Mexico border report less PA and fewer resources to support PA. While mothers may be traditional family gatekeepers, engaging fathers in their family's health may further promote healthy family behaviors.

Objectives:

- (1) Describe father-focused tailored-PA curriculum components for MH families.
- (2) Describe benefits of wrist-worn data collection and differences between using cut-points and machine learning estimates for wrist-worn accelerometer measured PA outcomes among children and adults.
- (3) Discuss PA-related outcomes for MH families and at least three considerations for future work.

Summary/Format: This symposium will begin with an eight-minute overview of the need for father-focused health and PA approaches, particularly in low-income MH families residing along the U.S.-Mexico border and a description of the overall ¡Haz Espacio para Papi! program targeting healthy eating, PA, and family dynamics change. Tyler Prochnow will describe the development of the ¡Haz Espacio para Papi! tailored PA curriculum that incorporated the iterative feedback of our promotora-research team and the associated process evaluation (12-minutes). Stewart Trost will provide an overview of the machine learning methods and activity classification algorithms used to process child and parent PA data collected from wrist-worn Actigraph GT9X accelerometers (12-minutes). Renée Umstattd Meyer will present the PA-related outcomes for child, father, and mother participants of the ¡Haz Espacio para Papi! program (12-minutes). This session will conclude with a 16-minute moderated discussion between delegates and presenters about the methods, findings, and implications from the ¡Haz Espacio para Papi! program. Interaction: This symposium aims to describe a uniquely tailored health program including development, measurement, and outcomes. Delegates will be encouraged to consider how the tailored components and methods may be used in their own work through

self-reflection discussion questions. These questions will be designed to engage with delegates to apply methods and concepts to future work.

The development and pilot testing of the ¡Haz Espacio para Papi! program physical activity curriculum for Mexican-heritage fathers and children

Tyler Prochnow¹, Prof. M. Renée Umstattd Meyer¹, Prof. Cassandra Johnson³, Mr. Luis Gómez², Prof. Joseph R. Sharkey²
¹Baylor University, Waco, United States of America, ²Texas A&M University, College Station, United States of America, ³Texas State University, San Marcos, United States of America

Special Interest Group: G. Children and families (SIG)

Purpose: Physical activity (PA) is linked to many health benefits. However, many children and adults do not meet PA recommendations. Specifically, Mexican-heritage (MH) families are less physically active and at greater risk for obesity and related co-morbidities than the general population. Culturally-tailored programs are suggested to support MH families in healthy PA behaviors. This presentation describes development and process evaluation of the ¡Haz Espacio para Papi! (Make Room for Daddy!) PA curriculum tailored to support healthy activity behaviors amongst MH families, but focused on the father/child relationship.

Methods: Academic-based and promotor-researchers simultaneously developed a six-week curriculum in Spanish and English to maintain semantic congruence. Elements of the Family Systems Theory and Social Cognitive Theory were used to theoretically ground the creation of activities. The curriculum included weekly interactive lessons provided on weekends and take-home challenges focused on father-child co-participation in light-to-moderate PA. Participating families consisted of child (aged 9-11), mother, and father. Families (n=47) were divided into five groups in a step-wedge intervention design. Weekly telephone calls were placed to adult participants to secure qualitative evaluation data. Thematic analysis was used to classify and describe participants reaction to the curriculum.

Results: A mean of 38 families participated in mid-week calls for a total of 190 process evaluation calls across all family groups and all weeks. Overall, 75.8% (n=144) of all calls made documented families had tried the physical activities at home at least once in prior week. In an overwhelming majority of calls, families said they liked the program as is (n=182 calls, 95.8%). When asked what they thought was the most valuable part of the lesson during calls, in 88 calls (46.3%) families mentioned the time spent together as a family was most important to them.

Conclusions: This presentation adds context to family-centered, father-focused health programs within MH populations which is important as fathers have been underrepresented in family centered programming. Positive responses by families speak to the success of culturally and contextually tailoring this curriculum to MH families.

Accelerometer data processing methods in the ¡Haz Espacio para Papi! Study: Application of machine learning methods for automated activity recognition in adults and children

Professor Stewart Trost¹, Tyler Prochnow², Prof. Joseph R. Sharkey³, Prof. M. Renée Umstattd Meyer²

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Special Interest Group: G. Children and families (SIG)

Purpose: An increasing number of studies are collecting raw tri-axial acceleration signal from the wrist. Raw acceleration signal increases the reproducibility and comparability of derived physical activity (PA) metrics; while the wrist placement reduces data loss due to non-wear and allows investigators to monitor sleep duration. However, accelerometer data processing methods for the wrist are less developed. Cut-point methods developed for waist-mounted accelerometers are not appropriate for the wrist because they do not account for upper limb movements during sedentary (SED) or light intensity activities with little or no ambulation. This presentation provides an overview of the machine learning methods used to process the wrist accelerometer data collected in the ¡Haz Espacio para Papi! Study.

Methods: ActiGraph GT9X accelerometers were used to estimate daily time in SED, light-intensity PA (LPA) and moderate-to-vigorous intensity PA (MVPA) in parents and children. Accelerometers were worn on the non-dominant wrist 24 hrs/day for 7 consecutive days. Raw acceleration signal (30 Hz) was processed into PA metrics using previously validated machine learned random forest (RF) activity classifiers trained for activity recognition in adults (Pavey 2017) and children (Trost 2014). For comparison purposes, PA metrics were calculated using ENMO cut-points developed by Hildebrand (2014).

Results: Accelerometer data from 117 parents and 58 children were processed into daily SED, LPA, and MVPA. Across all time points, the average number of valid monitoring days available for analysis was 33.1 ± 13.1 and 26.2 ± 8.8 days for parents and children, respectively. Among adults, RF predicted lower SED (373.1 ± 76.2 vs 688.3 ± 77.7 min/d), higher LPA (534.6 ± 80.6 vs 144.3 ± 29.7 min/d), and lower MVPA (80.5 ± 25.2 vs 132.7 ± 51.3 min/d) than ENMO. Among children, RF predicted higher SED (623.1 ± 56.6 vs 511.3 ± 68.9 min/d) and lower LPA (230.0 ± 50.4 vs 354.9 ± 61.2 min/d) than ENMO. MVPA levels were almost identical (53.8 ± 14.1 vs 52.5 ± 20.2 min/d).

Conclusions: Machine learned activity classification algorithms for wrist accelerometer data are viable and more valid option for interventions studies assessing PA outcomes in adults and/or children.

Physical activity outcomes for Mexican-heritage fathers, mothers, and children participating in ¡Haz Espacio para Papi! a father-focused, family-centered health program

Prof. M. Renée Umstattd Meyer¹, Tyler Prochnow¹, Prof. Kelly R. Ylitalo¹, Prof. Rodney Sturdivant¹, Professor Stewart Trost², Mr. Luis Gómez³, Prof. Cassandra Johnson⁴, Prof. Joseph R. Sharkey³

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Special Interest Group: G. Children and families (SIG)

Purpose: Physical activity(PA) is associated with numerous health benefits. However, many do not meet PA recommendations. Specifically, Mexican-heritage(MH) families report less PA and are often at greater risk for obesity and related co-morbidities than the general U.S. population. Family-centered PA approaches, particularly active engagement by MH fathers, may support family PA. This presentation describes PA outcomes of MH children, fathers, and mothers who participated in ¡Haz Espacio para Papi! (Make Room for Daddy!), a health program targeting healthy eating, PA, and family dynamics change tailored to support MH families.

Methods: Participating families (n=59, n=43 complete cases), consisting of child (M age: 10.1[SD=0.9]), father (M age: 39.9[SD=8.2]), and mother (M age: 36.2[SD=6.2]), were randomized into five clusters in a step-wedge design. PA was measured using ActiGraph GT9X accelerometers processed with machine learned random forest PA classification models for adults and children. Statistical analyses of intervention effects for moderate-to-vigorous PA(MVPA), light PA(LPA), and sedentary time for child, father, and mother, were conducted using linear mixed models (PROC MIXED, SAS-v.9.2).

Results: There was one statistically significant outcome –mothers' LPA– with an effect estimate of -23.2 (-34.0, -12.4, $p<0.0001$). For most outcomes random slope proved a better model since there were clear differences in the intervention effect across clusters. For example, the overall child MVPA estimated treatment effect, adjusting for time and cluster, was a mean increase of 4.36 ($p=0.38$). However, in Cluster 1 the estimate of the treatment effect using the estimated posterior slopes was 13.46, reflecting a larger increase in child MVPA observed in this cluster. On the other hand, Cluster 2 had an estimated decrease in child MVPA post-treatment (-2.29) adjusting for time effect.

Conclusions: This study demonstrated the feasibility of a father-focused health program for MH families. Although we did not observe overall increases in LPA or MVPA, or decreases in sedentary time, we observed heterogeneity across clusters with several clusters demonstrating increased MVPA for children and fathers and decreased sedentary time for children from pre- to post-intervention. The presentation will further discuss findings and implications of this father-focused program and next steps.

S1.03 - Examining the park environment for different age groups using a variety of methods, June 8, 2021

Chair: Louise Poppe, Post-doc, Ghent University

Discussant: Jenny Veitch, Deakin University

Purpose: The purpose of this symposium is to present and discuss research examining the role of parks for supporting health outcomes among different age groups using a variety of methods. Park use has been shown to vary among different age groups. This may be due to variations in preferences/needs. The novelty of this session is the discussion of innovative methods used to better understand what factors and park features are critical for appealing to people of all ages. This research can inform interventions aimed at maximising park visitation and park-based physical activity (PA) across the lifespan.

Rationale: Physical inactivity is a modifiable determinant of several chronic diseases (e.g., cardiovascular disease, type 2 diabetes) and premature death. Many people do not meet PA guidelines, especially people from lower socio-economic classes. Large-scaled, accessible interventions are needed to encourage people to increase their PA levels. Public parks provide opportunities to be active and are accessible to the public free of charge. Consequently, parks are considered important settings to promote PA among different age groups.

Objectives: To showcase recent park-based research among different age groups. To provide an overview of different methods for performing park-based research

Summary: The first presentation will discuss an online survey, which prompted adolescents to rate images of park features based on the degree to which each feature encouraged adolescents' (active) park use. The second presentation will discuss an online survey, which presented conjoint analysis tasks, to enable a relative ranking of important park features for encouraging older adults' park visitation and park-based PA. The third presentation will discuss the results of a natural experiment examining the impact of park refurbishment on park-use and park-based PA among the general population.

Format:

(5'): Introduction

(12'): Elise Rivera: Adolescents' ratings of important park features for facilitating visitation and physical activity in parks

(12'): Jenny Veitch: What entices older adults to parks? Identification of the relative importance of park features for facilitating park visitation and physical activity

(12'): Louise Poppe: The impact of park renewal on park-use and park-based physical activity: a natural experiment.

(19'): Discussion

Interaction: The audience will be encouraged to ask questions via the chat box function. These questions will be summarized by the discussant and presented during the general discussion. Audience members will also be able to ask questions live during the discussion.

Adolescents' ratings of park features for facilitating visitation and physical activity in parks

Ms. Elise Rivera¹, Prof. Anna Timperio¹, Dr. Venurs Loh¹, Prof. Benedicte Deforche^{2,3}, Prof. Kylie Ball¹, Associate Professor Jenny Veitch¹

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Special Interest Group: H. Policies and environments (SIG)

Purpose: This study aimed to quantitatively examine perceptions of the importance of selected park features for encouraging park visitation and park-based physical activity among adolescents (13-18 years).

Methods: Between November 2018- April 2019, adolescents (n=222, 14.0 ±1.1 years, 45% female) were recruited from seven secondary schools in socio-economically diverse areas of Melbourne, Australia. Participants completed an online survey, which asked them to rate photographic images of 40 park features (using a 1-10 scale) to indicate the degree to which each feature encouraged them to 1) visit and 2) be active in the park (10 = "really makes me want to"). The 40 park features had been identified as important in a previous qualitative study. For the two outcomes (visit, active), mean (SD) rating scores were calculated for each feature among the overall sample, and separately for males and females; and frequent versus infrequent park visitors. For park-based physical activity, mean ratings were also calculated for those meeting/not meeting physical activity guidelines. For both outcomes, each feature was assigned a ranking from 1-40 (1 represented highest mean rating).

Results: The two highest-rated features for supporting visitation and physical activity were consistent: large climbing structures and adventure playgrounds. The third, fourth, fifth and sixth highest-rated features for visitation were large curly slides, large swings, interactive areas and a café; and for park-based physical activity were outdoor fitness equipment, large curly slides, netball/basketball courts and large swings. Ratings for the park features for each outcome varied between males and females; frequent versus infrequent park visitors; and those meeting versus not meeting physical activity guidelines.

Conclusions: Parks equipped with large climbing structures, adventure playgrounds with large slides and swings, outdoor fitness equipment, sports courts, interactive areas and a café are likely to positively influence adolescents' visitation and physical activity in parks. It is paramount for stakeholders to consider what park features adolescents perceive important to ensure park planning attracts adolescents and supports physical activity during park visits. These findings offer a foundation for future studies to examine the relative importance of the identified features for encouraging (active) park use.

What entices older adults to parks? Identification of the relative importance of park features for facilitating park visitation and park-based physical activity

Associate Professor Jenny Veitch¹, Prof. Kylie Ball¹, Ms. Elise Rivera¹, Dr. Venurs Loh¹, Prof. Benedicte Deforche^{2,3}, Ms. Keren Best¹, Prof. Anna Timperio¹

¹Deakin University-Institute for Physical Activity and Nutrition, Melbourne, Australia, ²Ghent University- Department of Public Health and Primary Care, Faculty of Medicine and Health Sciences, Ghent, Belgium, ³Vrije Universiteit Brussel- Movement and Nutrition for Health and Performance Research Group, Department of Movement and Sport Sciences, Faculty of Physical Education and Physical Therapy, Brussels, Belgium

Special Interest Group: H. Policies and environments (SIG)

Purpose: The aim of this study was to examine the relative importance of park features for encouraging park visitation and park-based physical activity among older adults (65+ years).

Methods: In January 2020, older adults living in Australia (n=243; 71.5±4.91 years, 51% male) completed an online survey. The survey included a series of Adaptive Choice-Based Conjoint analysis tasks using Sawtooth software. Decision-making scenarios were presented, with participants choosing between parks that included different combinations of selected park features (i.e. birdlife, water feature, peaceful and relaxed setting, shady trees, gardens, BBQ areas, signage, walking paths, café, fountain, grassy open spaces, well maintained grass) and feature levels (i.e. present, not present). Individual part-worth utility and importance scores were estimated with Hierarchical Bayes (HB) analyses. Part-worth utilities represent the desirability of each level within a feature. Relative importance scores (percentages) reflect the maximum effect each feature has on choice, with greater importance scores reflecting greater contribution to choice.

Results: Overall, the most important features for park visitation were shady trees (conjoint analysis relative importance score 19.6%; 95%CI=18.3, 20.9) and a peaceful and relaxed setting (19.6%, 95%CI=18.1, 21.1), followed by walking paths (12.4%; 95%CI=10.9, 13.9) and birdlife (10.9%; 95%CI=9.5, 12.3). The most important feature for park-based physical activity was walking paths (19.6%; 95%CI=17.1, 22.1), followed by shady trees (16.9%; 95%CI 15.3, 18.5), a peaceful and relaxed setting (11.9%, 95%CI=9.7, 14.2), and birdlife (11.3%; 95%CI=9.0, 13.6). Part-worth utility scores showed the presence of a feature was always preferred over the absence of a feature.

Conclusions: Policy-makers should prioritise shady trees, a peaceful and relaxed setting, walking paths, and birdlife to ensure that parks meet older adults' needs and encourage physical activity during park visits.

The impact of park renewal on park use and park-based physical activity: A natural experiment

Dr. Louise Poppe¹, Prof. Delfien Van Dyck¹, Associate Prof. Jenny Veitch², Prof. Benedicte Deforche¹

¹Ghent University, Ghent, Belgium, ²Deakin University, Melbourne, Belgium

Special Interest Group: H. Policies and environments (SIG)

Purpose: The aim of this study was to examine the impact of park renewal on park use and park-based physical activity (PA).

Methods: In 2014, the System for Observing Play and Recreation in Communities (SOPARC) was used to audit park use and park-based PA in two similar parks in Ghent (Flanders, Belgium). Trained researchers performed the SOPARC audit in both parks on five weekdays and four weekend days. On each of these days the audits were performed in the morning (7:30 AM), during lunch (12:30 PM), in the afternoon (3:30 PM) and in the evening (6:30 PM). In 2020, one of these parks was extensively renovated taking into account the needs of different park users (e.g., paved walking paths suitable for wheelchairs were created, low vegetation was reduced, playscapes and outdoor exercise equipment were installed, and a football cage was added). Immediately after these renovations, the SOPARC audit was repeated in both parks. Based on the audits, the total number of park visitors as well as the mean PA intensity level were calculated for each observation moment for each of the observation days. For both outcomes (i.e., number of visitors and mean PA intensity scores), a (negative binomial) regression model was performed with park (i.e., intervention park vs. control park), time (i.e., baseline vs. follow-up) and the time by park interaction as independent variables. The time by park interaction was used to assess the effect of the park renewal on park use and park-based PA.

Results: The significant time by park interactions identified for both the number of visitors ($\beta(SE) = -1.34(0.29)$, $p < .001$) and the mean PA intensity scores ($\beta(SE) = -15.33(2.01)$, $p < .001$), indicate that the increase in visitors and park-based PA was significantly stronger in the intervention park than in the control park.

Conclusions: Park renewal taking into account the needs of different park users has the potential to increase park use and to facilitate PA among park visitors.

S1.04 - Health professionals as promoters of physical activity, June 8, 2021

Chair: Kate Purcell, Study Coordinator Propose, The University of Sydney

Discussant: Cathie Sherrington, University of Sydney

Purpose: This symposium will generate evidence-informed ideas for enhancing health professionals' promotion of physical activity (PA). **Rationale:** Increasing PA for people at all ages and capacities is an urgent public health goal. PA counselling by health professionals is effective at increasing PA. As specialists in human movement and exercise prescription working across diverse health settings, physiotherapists are ideally placed to provide PA counselling and referral. Physiotherapists regard PA promotion as part of their role, yet do not routinely incorporate it into their practise. The key barriers are well established, but what can we do about them?

Objectives: We will integrate findings from three studies focusing on physiotherapists' PA promotion:

1. a cross-sectional survey of 84 physiotherapists in five Sydney hospitals;
2. a focus group study involving 39 physiotherapists working in Sydney hospitals, networks and community teams; and
3. an evaluation of a cluster-randomised controlled intervention trial of physiotherapist-delivered health coaching.

Four questions will be addressed:

1. What should PA promotion by physiotherapists look like?
2. What strategies are likely to be most effective for supporting health professionals to promote PA?
3. What methods should we use to advance this agenda? What theories/models can help and how can we include diverse perspectives?
4. What contextual/structural factors should be targeted? And how? Going beyond barriers and enablers to PA promotion, we aim to generate creative solutions that take account of local contexts and consider the needs of groups who are in most need of PA support.

Summary: This symposium will present evidence from three studies that highlight critical questions relating to PA promotion by physiotherapists and the role of researchers and health systems in supporting this. Delegates will explore these questions in small groups.

Format:

1. Introduction to the topic: KP (5 mins)
2. PA promotion by physiotherapists and its influences: LH (7 mins)

3. Perspectives from physiotherapists on promoting PA: KW (7 mins)
4. The power of therapeutic alliance in PA promotion: AH (7 mins)
5. Summary of cross-study learnings and questions arising: KP (6 mins)
6. Breakout rooms for delegates to discuss questions (12 mins)
7. Feedback and general discussion: Discussant (16 mins)

Interaction: One presenter will join each breakout group to facilitate discussion and answer questions. They, or a nominated delegate, will feed back to the seminar. The Discussant will facilitate dialog. Participants can select which breakout room to join and thereby which question to engage with.

Physical activity counselling within physiotherapy usual care and influences on its use: a cross-sectional survey

Dr. Leanne Hassett^{1,2,3}, Mr. Shiyi (Julia) Zhu¹, Mr. Matthew Jennings⁴, Dr. Marina Pinheiro^{1,2,5}, Dr. Bernadett Brady^{1,4}, Prof. Sarah Dennis^{1,3,4}, Ms. Lauren Christie^{4,6}, Ms. Balwinder Sidhu⁴, Dr. Abby Haynes^{2,5}, Prof. Colin Greaves⁷, Prof. Cathie Sherrington^{2,5}

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Special Interest Group: E. Implementation and scalability (SIG)

Purpose: Physical activity counselling is effective at increasing physical activity when delivered in healthcare but is not routinely practised. Part 1 of the Brief Physical Activity Counselling by Physiotherapists (BEHAVIOUR) study aimed to determine: 1) current use of physical activity counselling by physiotherapists working within publicly funded hospitals in a local health district in Australia; 2) influences on this behaviour.

Methods: Cross-sectional survey as part of pre-implementation work to inform the development of implementation strategies to be tested in a planned hybrid type II implementation-effectiveness cluster randomised controlled trial. The survey investigated physiotherapists' frequency of incorporating 15 different elements of physical activity counselling into their usual healthcare interactions, and 53 potential influences on their behaviour framed by the Capabilities, Opportunities, Motivation- Behaviour (COM-B) behaviour change theoretical model.

Results: The survey sample comprised 84 physiotherapists (79% female, 48% <5 years of experience). Physiotherapists reported using on average 5 (SD:3) elements of physical activity counselling with at least 50% of their patients who could be more active. 70% of physiotherapists raised or discussed overall physical activity, but less than 10% measured physical activity or contacted community physical activity providers. Physiotherapists generally indicated good motivation in acknowledging their role in providing physical activity counselling in routine care (only 1% agreed this was not part of a physiotherapist's job). The most common barriers were related to "opportunity", with 57% indicating difficulty locating suitable community physical activity opportunities and >90% indicating their patients lacked financial and transport opportunities. Barriers related to capability were also reported including lack of knowledge of evidence supporting physical activity counselling (62%) and what local physical activity opportunities exist (61%), and lack of skills in how to measure physical activity, make action plans and locate and make referrals to community services.

Conclusions: Survey findings confirm that key elements of physical activity counselling are not routinely incorporated in physiotherapy practice and that barriers to this behaviour relate to physiotherapists' opportunity, capability and to a lesser extent motivation. Implementation strategies should include both education and training as well as tailored strategies to support local team solutions to enhance community physical activity referral.

People associate us with movement so it's an awesome opportunity": Perspectives from physiotherapists on promoting physical activity, exercise and sport

Ms. Kerry West^{1,2,3}, Ms. Kate Purcell^{1,2}, Dr. Abby Haynes^{1,2}, Dr. Jennifer Taylor^{1,2}, Dr. Leanne Hassett^{1,2,4}, Prof. Cathie Sherrington^{1,2}

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Special Interest Group: L. Other

Purpose: Insufficient physical activity (PA) is a critical public health issue especially in the context of COVID-related deconditioning. Health professionals are well placed to promote community-based PA but there is little supporting implementation research. We aimed to explore physiotherapists' knowledge, views, attitudes and experiences regarding the promotion of physical activity, exercise and sport within daily clinical practice in order to guide development of strategies to support implementation of PA promotion by physiotherapists, in particular those treating older people, and adults and children with a disability.

Methods: We conducted a cross-sectional survey of physiotherapists working in public hospitals in Sydney, Australia. We followed this with a qualitative study with interviews and focus groups with 39 physiotherapists. Two researchers coded transcripts with an iterative coding approach. Thematic analysis involved a reflective approach with the use of "critical friends" to challenge interpretations.

Results: Survey data was collected from 84 physiotherapists from six hospitals. Half of the physiotherapists promoted physical activity frequently or often. Advice regarding participation in structured sport and exercise was less frequent. Those working with children and who were more experienced were more likely to promote PA. Qualitative analysis returned five main themes: putting principles into practice; working with conflicting priorities; multiple client barriers; connections build confidence; and the battle for information. The physiotherapists accepted their legitimate role in PA promotion. Limited clinical and administrative time and acute treatment priorities often superseded PA promotion but the lack of updated information regarding suitable community-based PA opportunities and lack of trust in community providers were the biggest barriers.

Conclusions: Strategies to enhance PA promotion by physiotherapists should address time and information constraints and build partnership connections between health professionals and community-based PA providers.

Building Therapeutic Alliance in Physiotherapist-Delivered Physical Activity Coaching for Healthy Ageing

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Special Interest Group: A. Ageing (SIG)

Purpose: Therapeutic alliance is a pivotal component of person-centred healthcare. It can enhance program engagement and adherence, and improve treatment outcomes and satisfaction, but it is poorly operationalised. We aimed to develop an empirical model that describes how therapeutic alliances can be operationalised in clinical and research settings, and used this model to enhance our evaluation of the Coaching for Healthy Ageing (CHAnGE) trial.

Methods: We conducted a literature scan followed by secondary analysis of interviews with participants in the CHAnGE trial (n=32) who were purposively recruited for maximum variability, plus a focus group with the physiotherapists who delivered health coaching in that trial (n=3). Analysis was inductive (thematic) and deductive (using a therapeutic alliance model derived from a literature review and informed by earlier analyses).

Results: Therapeutic alliance is founded on four 'building blocks': 1. Collaborative decision-making between clients and practitioners involving negotiated goals and activities, and open exchange of information and views, 2. Trusting person-centred relationships underpinned by practitioner credibility, benevolence, dependability and authenticity, 3. Professional practitioner skills incorporating technical and relational skills, positivity and reflective practice, and 4. Structural supports ensuring responsiveness, privacy and resourcing. Findings indicated that health coaching in our intervention built highly effective therapeutic alliances, powerfully influencing participants to engage with and sustain physical activity. Four CHAnGE intervention components were identified as strengthening this alliance: empowerment-focused health coaching training; home visits; the coaching format (the duration and intensity of phone coaching with a dedicated coach), and provision of free activity monitors.

Conclusions: This study identifies key concepts and practical 'building blocks' of therapeutic alliance, showing how these were successfully operationalised within an intervention. This may help those in clinical and research settings to recognise the importance and characteristics of therapeutic alliance and put it into practice as a core strategy for optimising engagement and outcomes.

S1.05 - Novel ways of using Compositional Data Analysis (CoDA) to characterize movement behavior patterns in children, June 8, 2021

Chair: Simone Verswijveren, Research Fellow, Deakin University

Discussant: Tom Stewart, Senior Research Fellow, Auckland University of Technology

Purpose: To explore novel techniques for analysing patterns of physical activity, sedentary behaviours, and sleep (i.e., movement behaviour) using Compositional Data Analyses (CoDA) in children

Rationale: Regular participation in physical activity, limiting sedentary behaviours, and sufficient sleep are beneficial for children's health. Recent evidence suggests that not only total time spent in movement behaviours, but also the patterns of accumulation, may be important for health. Moreover, it has been acknowledged that time spent in movement behaviours are co-dependent, that is, more time spent on one behaviour necessarily takes away time from at least one other behaviour. Accordingly, in order to obtain a detailed understanding of movement behaviour patterns, analyses that go beyond the traditional focus of total volumes of these behaviours are required. Consideration should be given to the way in which behaviours are accumulated, including all different intensities across the movement behaviour spectrum, and context in which these are accumulated.

Objectives:

To summarise recent developments in the analysis of movement behaviour patterns among children.

To present novel techniques for analysing movement behaviour patterns, including parent-child proximity, different bout lengths, and day-to-day patterns, using CoDA in children.

To discuss strength, limitations, and future possibilities of using CoDA for assessing different movement behaviour patterns.

Summary: The session will begin with an overview of existing analyses of movement behaviour patterns, including traditional statistical analysis as opposed to methods that accurately deal with time such as CoDA. The first presentation focuses on associations for parent's movement behaviours and parent-child proximity with preschool-aged children's movement behaviours. The second presentation describes duration and variability in day-to-day movement behaviours among Australian children. The third presentation presents time-use compositions, focusing on time spent in shorter and longer bouts of sedentary behaviour and physical activity, and associations with cardiometabolic biomarkers.

Format:

0-3: Introduction - Simone Verswijveren

3-17: Presentation 1 - Nicholas Kuzik: Parent-child movement behaviours and Bluetooth proximity in preschool-aged children: A compositional substitution analysis

17-31: Presentation 2 - Charlotte Lund Rasmussen: Exploring day-to-day variability in composition of movement behaviours among Australian school-aged children

31-45: Presentation 3 - Simone Verswijveren: Understanding accumulation patterns of time across the movement behaviour spectrum in relation to children's health: a Compositional Data Analysis approach

45-60: Discussion - Tom Stewart

Interaction: Questions will be asked via the chat function of Zoom. During the Discussion section, after a brief overview, the Discussant will invite those with questions to speak.

Parent-child movement behaviours and Bluetooth proximity in preschool-aged children: A compositional substitution analysis

Dr. Nicholas Kuzik^{1,2}, Dr. Patti-Jean Naylor³, John Spence¹, Dr. Valerie Carson¹

¹Faculty of Kinesiology, Sport and Recreation, University of Alberta, Edmonton, Canada, ²Children's Hospital of Eastern Ontario (CHEO) Research Institute, Healthy Active Living and Obesity (HALO) Research Group, Ottawa, Canada, ³Institute of Applied Physical Activity and Health Research, School of Exercise Science, Physical and Health Education, University of Victoria, Victoria, Canada

Special Interest Group: J. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

Purpose: The purpose of this study was to examine the associations for parent's movement behaviours and parent-child proximity with preschool-aged children's movement behaviours.

Methods: Bluetooth enabled ActiGraph wGT3X-BT accelerometers were used to classify a parent's and a child's movement behaviours as sleep, stationary time, light-intensity physical activity (LPA), and moderate- to vigorous-intensity physical activity (MVPA). Parent-child proximity was assessed using the Bluetooth sensor, and parent-child proximity behaviours were categorized as: no proximity (NP) detected, proximity detected and matching parent-child movement behaviours (Co), and proximity detected but mismatching parent-child movement behaviours (Close). Lastly, proximity movement behaviours were categorized specific to children's movement behaviours (e.g., NP-MVPA, Co-MVPA, and Close-MVPA). Compositional linear regression models were created with pivot coordinates to determine the dominance of a single component of the composition in relation to the rest of the composition. When compositional regression models were significant, 1% one-for-all compositional substitutions were conducted.

Results: Parent movement behaviours were not associated with children's movement behaviours. For parent-child proximity behaviours, total Close proximity was positively associated with children's LPA, whereas NP was negatively associated with LPA. Substituting 1% of the proximity behaviour composition to either Close or NP resulted in +2.45 minutes/day or -0.74 minutes/day of LPA. For parent-child proximity movement behaviours, NP-MVPA was positively associated with children's MVPA. Reallocating 1% of the proximity-MVPA composition to NP-MVPA resulted in +1.61 minutes/day of MVPA.

Conclusions: Novel aspects of this study include the use of Bluetooth proximity sensing to determine the patterns of parent-child proximity and movement behaviours, as well as the use of compositional data analyses to appropriately examine the relationships between these compositions. No associations were found between the compositions of parent's and children's movement behaviours in this study. However, other patterns of parent-child proximity and movement behaviours were observed to be important for children's movement behaviours. Parent-child proximity may be a modifiable correlate of children's physical activity. However, future research should examine the findings in this study with more robust study designs (i.e., longitudinal and larger sample size), while measuring the whole family, and in other settings such as childcare.

Exploring day-to-day variability in composition of movement behaviours among Australian school-aged children

Dr. Charlotte Lund Rasmussen^{1,2}, Dr. Dorothea Dumuid², Prof. Timothy Olds²

¹National Research Centre for the Working Environment, Copenhagen, Denmark, ²Alliance for Research in Exercise, Nutrition and Activity, Allied Health and Human Performance, University of South Australia, Adelaide, Australia

Special Interest Group: J. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

Purpose: Understanding variability in day-to-day durations of movement behaviours can elucidate if particular day-types would benefit from targeted interventions. High variability in daily durations across a week may indicate lack of daily routine and be a marker for an unfavourable lifestyle. The overall aim of this study was to use a compositional approach to characterize patterns of day-to-day variability in duration of movement behaviours among children, and to compare daily durations among children with high and low day-to-day variability.

Methods: This study was based on 7-day, 24-hour accelerometry data from 1368 children (11-12 years old, 50% males) participating in the Child Health CheckPoint study, nested within the Longitudinal Study of Australian Children. A daily four-part movement behaviour composition consisting of moderate-to-vigorous physical activity (MVPA), light physical activity (LPA) sedentary behaviour and sleep was created for each participant. Day-to-day movement behaviours were described using compositional means and variability in each child's week was described using a compositional variation matrix of log-ratio variances. Children were categorised as having a high or low day-to-day variability using a median split based on their total variance, calculated from the sum of all values in their variation matrix.

Results: Children were less active and more sedentary on weekends compared to weekdays (e.g., 13 min MVPA, 145 min LPA and 706 min sedentary on Sunday vs 15 min MVPA, 152 min LPA and 694 sedentary on Monday). They slept less on weekends compared to weekdays (e.g., 576 min on Sunday vs. 581 min on Wednesday). Children with higher day-to-day variability consistently had lower MVPA (up to 15 min/d) and lower LPA (up to 146 min/d) and higher sedentary time (up to 722 min/d) than children with lower day-to-day variability.

Conclusions: Among this sample, weekdays had higher durations of physical activities and lower sedentary time compared to weekends, indicating a requirement for programs to encourage weekend physical activity. Our findings suggest that greater inconsistency in day-to-day durations of behaviours may accompany a less active, more sedentary lifestyle. Further research is warranted to understand how regularity in daily behaviours can be characterised and related to health.

Understanding accumulation patterns of time across the movement behaviour spectrum in relation to children's health: a Compositional Data Analysis approach

Dr. Simone Verswijveren¹, Dr. Karen Lamb², Prof. Josep Martin-Fernández³, Dr. Elisabeth Winkler⁴, Dr. Rebecca Leech¹, Prof. Anna Timperio¹, Prof. Jo Salmon¹, Prof. Robin Daly¹, Dr. Ester Cerin^{5,6}, Prof. David Dunstan^{5,7}, Dr. Rohan Telford⁸, Prof. Richard Telford⁸, Dr. Lisa Olive^{9,10,11}, Associate Professor Nicola Ridgers¹

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Special Interest Group: J. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

Purpose: This study aimed to describe children's time-use compositions, focusing on time spent in shorter and longer bouts of sedentary behaviour and physical activity, and their associations with cardiometabolic biomarkers.

Methods: Hip-worn ActiGraph accelerometer and cardiometabolic biomarker data from 7–13 year olds from two Australian studies were pooled (n=782 complete cases). A nine-component time-use composition was formed, including time in shorter and longer bouts of sedentary behaviour, light-, moderate- and vigorous-intensity physical activity and "other time" (i.e., non-wear and sleep). Sedentary shorter and longer bouts were defined as <5 and ≥5 min, respectively. Physical activity (including light-, moderate- and vigorous-intensity) was subdivided into time in bouts of <1 and ≥1 min. Observed zeros (n=9 participants for time in longer VPA bouts) were replaced using the multiplicative lognormal imputation method. Regression models examined associations between the nine-component movement behaviour composition and cardiometabolic biomarkers. Then, associations between ratios of longer relative to shorter activity patterns, and each intensity relative to more intense activities and "other time", with cardiometabolic biomarkers (zBMI, waist circumference, lipids, blood pressure, and a summary z-score) were derived.

Results: Confounder-adjusted models (clustering by school; age, sex, SES, dataset) showed that the overall movement behaviour composition was associated with adiposity, blood pressure, lipids and the summary score. Specifically, more time in longer relative to shorter bouts of light-intensity physical activity was significantly associated with greater zBMI ($\beta=1.79$, SE=0.68, $p=0.009$) and waist circumference ($\beta=18.35$, SE=4.78, $p<0.001$). With each activity considered relative to all higher intensities and "other time", more time in light-intensity and vigorous-intensity physical activity and less time in sedentary behaviour and moderate-intensity physical activity, were associated with lower waist circumference.

Conclusions: The results suggest that accumulating physical activity, particularly light-intensity, in frequent short bursts may be beneficial for improving adiposity compared to engaging in the same amount of these intensities in longer bouts. These findings should be corroborated or refuted with evidence from other samples, including sleep data and longitudinal designs.

Dare 2Share

Dr. Teatske Altenburg, Assistant Professor, Amsterdam UMC

Physical activity in the early years (1)

Current guidelines for physical activity in the early years (0-4 years) lack support by high-quality evidence. Existing studies use a large variety of measures of physical activity with limited or unknown validity. In this #Dare2Share session we aim to discuss these challenges when assessing physical activity in infants, toddlers and preschoolers: which operationalization reflects children's activity best? Should we operationalize physical activity differently in the different age groups? What methods are suitable to assess young children's physical activity?

S1.06 - Recruitment, engagement and retention of adolescents and young adults in cohort studies, June 8, 2021

Chair: Olivia Alliott, Phd Student, University of Cambridge

Discussant: Esther Van Sluijs, MRC Senior Investigator, University of Cambridge

Purpose: To explore and assess the evidence for methods of recruitment, engagement and retention of adolescents and young adults in longitudinal cohort studies.

Rationale: The changes in diet and physical activity as individuals transition through adolescence and into early adulthood are widely acknowledged as an area requiring further research. However, this group is difficult to engage in research studies and follow-up over time. Given the little published literature on methods to recruit, engage and retain adolescent and young adult populations in longitudinal population cohorts, this symposium will explore insights from those conducting such studies across a range of disciplines, to share knowledge and inform future research efforts in diet and physical activity.

Objectives:

- (i) to learn from the experiences of those collecting data from adolescents and young adults in different settings;
- (ii) to bring together expertise from investigators across disciplines to inform diet and physical activity research;
- (iii) to explore findings on what works in different sections of this population; (iv) to share results on novel methods which have proven successful in this population.

Summary: Three presentations will cover different aspects of the recruitment, engagement and retention of adolescent and young adult study participants. First, Rachana Desai (University of the Witwatersrand, South Africa) will discuss participant engagement research conducted as part of the BEACON longitudinal cohort study in South Africa. Her qualitative research explores perspectives of the study advisory group on study procedures, recruitment methods and novel methodologies and their role in co-design of the data collection activities. The second presentation, from Tuija Tammelin (LIKES Research Centre, Finland) focuses on a school-based study and prevention of participant drop-out through an intensive physical activity assessment study. Finally, Rhiannon Thompson (Imperial College, UK) will discuss the challenges of maintaining engagement of an adolescent cohort as they transition into young adulthood, and the success of different engagement strategies. Esther van Sluijs (University of Cambridge, UK) will facilitate a discussion among the speakers and audience building on the presentation to share further insights.

Format: The session will be introduced by Olivia Allcott (University of Cambridge; 5-minutes), followed by three 10-minute speaker presentations, allowing 25-minutes for discussion and questions.

Interaction: The chair will encourage the audience to submit questions and share their own experience through the chat function. Questions and comments accumulated during the presentations will be selected by the discussant, and the audience invited to verbally share their own experiences within the themes discussed.

Retention strategies in a longitudinal adolescent cohort study: Participatory engagement research in a low income setting

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¹DSI-NRF Centre of Excellence in Human Development, University of the Witwatersrand, Johannesburg, South Africa

Special Interest Group: J. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

Purpose: Participant engagement research provides a deeper understanding of participation in research and potentially 'hidden' barriers or benefits which can inform adjustments to research to be more participant friendly. This type of qualitative data can help researchers develop an understanding of whether, how and why the research was successful and/or meaningful for both researchers and participants, with the potential to improve retention of cohorts as well as inform the interpretation of results. The aim of this presentation is to review the various participant engagement research strategies employed in a longitudinal adolescent cohort in a low-income setting.

Methods: The participatory engagement research is part of the Behaviour, Executive function in Adolescents with Conduct Disorder (BEACON) study. This is a repeated measures longitudinal cohort study of parents and their adolescents aged 11 who will be followed up at age 13 years. The study established an adolescent and parent advisory group consisting of 24 members. The advisory group participated in focus group discussions, photovoice and community walks exploring the following: perspectives on study procedures, participant recruitment and measures and the piloting of novel methodologies and objective assessments.

Results: The qualitative research provided feedback on the lived experience of adolescence and parents in Soweto and allowed them to articulate their views on scientific research priorities. Having the research done in a low-income setting, participant retention strategies included the provision of incentives, transport, meals and frequent telephonic contact with study participants. The participants also played a role in co-creating the data collection methods such as clarifying and validating measures as well as the creation of an online recruitment system.

Conclusions: The strategies proposed in this study has the potential to increased impact through participatory co-design of rigorous, accessible, engaging data collection and dissemination activities that met the needs of researchers, while maintaining respect for the dignity, preferences and experiences of adolescents themselves and their parents.

Recruitment, engagement and retention of adolescents in a two-year school-based follow-up study

Dr. Tuija Tammelin¹, Mr. Janne Kulmala¹, Mr. Harto Hakonen¹, Dr. Jouni Kallio¹

¹*LIKES Research Centre for Physical Activity and Health, Jyväskylä, Finland*

Special Interest Group: J. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

Purpose: The purpose of this study was to describe participation and drop-out rates in a school-based physical activity study during two-years follow-up, and to discuss methods to improve the representativeness of the study population and prevention drop out.

Methods: The pupils for this two-year follow-up study were recruited from nine schools throughout Finland. A total of 1,710 pupils from grades 4 to 7 (mean age 12.6 ± 1.3 y at baseline) were invited to participate, and 970 (56.7%) gave their permission to participate. Pupils' physical activity was measured five times (M1-M5) using a hip-worn accelerometer for seven consecutive days. Pupils also reported their physical activity by a questionnaire. Written consent was obtained from both the pupils and their guardians.

Results: The participation rate at baseline was inversely associated with age being 78%, 63%, 55% and 49% for the pupils at grades 4, 5, 6 and 7 respectively. The number of pupils who responded to the self-report questionnaire during school class was 949 at baseline (M1) and 798 at the fifth measurement (M5). The number of participants who had valid accelerometer data on at least two weekdays and one weekend day (2+1) was 771 at baseline and 328 at M5, and the number of those who had valid data for all seven days was 328 at baseline and 134 at M5. The pupils who remained in accelerometer measurements (2+1 days, M5 versus M1) were more likely girls (12%), younger (by 0.24 years), had higher body mass index (by 0.6 kg/m²), and participated less in moderate to vigorous physical activity during leisure time (by 4.7 min/day) than the pupils who dropped out.

Conclusions: Retention of adolescents in school-based longitudinal studies is a challenge. Adherence to self-reported physical activity measurement was much higher compared to accelerometer-based measurements. The practical means how to improve representativeness of the study population and to prevent drop-out from the physical activity monitoring will be discussed. Based on our experience, motivation is needed at all levels, including school principals, teachers, pupils and their guardians.

The Study of Cognition, Adolescents and Mobile Phones (SCAMP): maintaining engagement from early adolescence to young adulthood

Miss Rhiannon Thompson¹, Mr. Alex Spiers¹, Dr. Charlotte Booth¹, Prof. Mireille Toledano¹

¹Imperial College London, London, United Kingdom

Special Interest Group: J. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

Purpose: To share the challenges, successes, and learnings arising from engaging a cohort which was established at the age of 11/12 (N=6900) as they progress into late adolescence and young adulthood.

Methods: Although parent and teacher engagement were the vital factor for initially establishing and maintaining the cohort, when the SCAMP participants reached sixth form, we required their personal consent and therefore engagement and interest. This coincided with the COVID-19 pandemic, meaning our engagement methods had to be even more innovative and adaptive. In this presentation we will share the strategies which were used and what we learnt from their varying levels of efficacy.

Results: Establishing a representative Young People's Advisory Group (YPAG) of SCAMP participants and meeting monthly to garner their opinions on our research strategies offered really important insights for older adolescent engagement, such as the importance of communicating the purpose of the research and, where possible, current findings. As most of the cohort are about to leave school, we are now developing an App with the YPAG, who are directing us as to what would encourage them to download the App and to keep it on their phones. Further, we set up a student Ambassador program, where a student from each SCAMP school acted as 'the face of SCAMP'; communicating with students, keeping them interested, and sharing our findings and research tasks. We found that having an ambassador in a school when we disseminated a survey doubled response rates on average, so having that peer-to-peer communication was a really valuable investment of time and resource.

Conclusions: We will share and explore the strategies which were most and least successful and what we learnt from young people about working with this age group. This knowledge can be applied to any research involving older adolescents and can advance recruitment and engagement methods to be more successful, efficient, representative, and beneficial for participants.

S1.07 - To sit or to stand? Breaking up adolescents' sedentary behavior in education, June 8, 2021

Chair: Rianne Golsteijn, Assistant Professor, Open University of the Netherlands

Discussant: Renate de Groot, Full Professor, Open University of The Netherlands

Purpose: To share and present the relevance, effects, and feasibility of breaking up adolescents' sedentary behavior (SB) in different educational settings.

Rationale: While emerging evidence suggests associations between physical activity and cognition and learning, more recently SB has become another focus point in the field of physical activity behavior (PAB). Educators and researchers have acknowledged that student populations tend to engage in high levels of SB. While interrupting SB with standing desks may be a relatively easy option to change this unhealthy behavior, associations with cognitive performance and student mental wellbeing (SMW) in adolescents are not yet studied extensively.

Objectives: Participants in this session will gain insights into the effects of standing desks on outcomes relevant for education (i.e. cognition and learning) and PAB in adolescents. Furthermore, they will also gain insights in associations between PAB and SMW. Viewpoints of students on the feasibility of implementing standing desks will provide insights for implementation in practice. Additionally, differences and similarities between the educational settings in which adolescents are possibly enrolled will be discussed.

Summary: The symposium presentations address the effects of breaking up SB within the educational setting on a broad diversity of outcomes (i.e. cognition, learning, PAB, and SMW) relevant for students' health. Furthermore, they cover a broad spectrum of educational settings in which adolescents are possibly enrolled. The symposium starts with the effects of standing desks on cognition in secondary education. Improved cognition may also improve learning outcomes. Thus, the second presentation will cover the effects of standing tutorials in a university setting on learning, and additionally address the effects on PAB. Since SMW also fosters learning, the associations between PAB and wellbeing are covered in the third presentation. Additionally, this presentation will address students' viewpoints on the implementation of standing desks in practice.

Format:

Rianne Golsteijn; topic introduction

Veerle van Oeckel; standing desks and cognition in secondary education

HQ Chim; standing tutorial groups and learning in higher education

Mara Kirschner; PAB and SMW in vocational education

Renate de Groot; discussion on differences and similarities between studies with active involvement of the audience

Interaction: The discussant prepares questions for the speakers and audience to highlight differences and similarities between the studies. For example regarding the use of standing desks, perceptions of students, differences between educational settings. The audience will be involved actively by responding on statements and posting questions using interactive software (e.g. Mentimeter).

UP4BRAINS: The effect of standing desks in secondary schools on sedentary behaviour and cognitive performance in Flemish adolescents

Ms. Veerle Van Oeckel¹, Prof. Maïté Verloigne¹, Prof. Benedicte Deforche¹

¹Ghent University, Ghent, Belgium

Special Interest Group: L. Other

Purpose: Excessive sedentary behaviour is associated with adverse health indicators in adolescents. Nevertheless, adolescents spend the majority of the day sedentary, of which a large amount is accumulated at school whilst sitting in class. Implementing standing desks in the classroom is a possible strategy to reduce sitting in class. To support the implementation, it is needed to not only study the effect of standing desks on sedentary time, but also on cognition, as this is the primary interest of schools. Study aims are (1) evaluating the effect of implementing standing desks in the classroom on adolescents' cognition and outcomes related to sedentary time, and (2) evaluating the process of implementing standing desks.

Methods: We conducted a clustered controlled trial including 3 control schools and 3 intervention schools from Flanders, Belgium, each with one participating class from the 7th or 8th Grade. Pre-test measurements were performed in September-October 2020. Hereafter, 10 standing desks were used for 4-5 weeks in each intervention class. Teachers were asked to make a rotation schedule so the standing desks were used to the maximum. In October-December 2020 post-test measurements were conducted. Sitting time, prolonged sitting time and breaks in sitting time were measured using an Axivity AX3 inclinometer. Cognition was measured using six Cambridge Brain Sciences tasks. Data will be analysed in R using multilevel linear models. Focus groups with pupils were performed to evaluate the process of implementing standing desks. Data are analysed via NVivo.

Results: 120 pupils (12.91±0.63y, 57.5% boys) participated in the study. Effects on the cognitive tasks (double trouble, spatial planning, token search, monkey ladder, spatial span and digit span) and sedentary outcomes will be presented at the conference. Pupils indicated to enjoy alternating between sitting and standing. They also indicated that their preference to use standing desks depends on (the time of) the day, the course and its content.

Conclusions: Standing desks are generally well accepted by secondary school pupils. If using standing desks has positive effects, or at least no detrimental effects, on pupils' cognition, this could be an important factor to persuade school staff for using standing desks.

Standing tutorial groups and learning in higher education

Dr. H.Q. Chim¹, Prof. Renate de Groot², Dr. Pascal van Gerven¹, Prof. Mirjam Oude Egbrink¹, Dr. Roy Erkens¹, Dr. Ulrike von Rango¹, Dr. Jos Broers¹, Prof. Dr. Hans Savelberg¹

¹Maastricht University, Maastricht, Netherlands, ²Open University of the Netherlands, Heerlen, Netherlands

Special Interest Group: L. Other

Purpose: With extensive research emphasizing the health risks of prolonged sedentary behavior (SB), we explored the effects of standing versus sitting in university tutorial group meetings on overall physical activity behavior (PAB) and learning. Because previous studies showed that light physical activity (LPA) may enhance learning-related physiological mechanisms, other than hypothesizing that overall PAB would improve, we hypothesized that standing tutorial group meetings would lead to better learning.

Methods: In this exploratory, longitudinal, and randomized controlled trial, 96 first-year students were randomly allocated to a Sit/Stand group, with 2-hour tutorial group meetings scheduled, once/twice per week, for nine weeks. PAB was measured using the activPAL3™ triaxial activity monitor, analyzed with generalized linear mixed models. Learning was evaluated using exam grades, audio-recorded tutorial interactions, and concept maps. Mann-Whitney U test was used to compare exam grades between groups. The tutorial interactions were coded as learning-oriented interactions (exploratory questioning, cumulative reasoning, or handling of conflict) or non-learning-oriented interactions (procedural or off-task). Marginal models and factorial ANOVAs were used to analyze the concept maps' data.

Results: Both on tutorial and non-tutorial days in week 4-5, the stand group ($n = 41$) showed less SB ($\beta = -0.092$, $SE = 0.044$, 95% CI: -0.179, -0.006) and more moderate-to-vigorous physical activity ($\beta = 0.320$, $SE = 0.160$, 95% CI: 0.004, 0.635) compared to the sit group ($n = 36$). On tutorial days, the stand group showed more LPA than the sit group ($p < .001$, $d = 1.04$).

The average exam grade of the Stand group (6.5 ± 1.6 , on a 10-point scale) was higher than the Sit group (5.8 ± 1.6), but the difference only approached significance, $U = 1130.0$, $z = 1.80$, $p = .071$, $r = .20$. Additionally, the use of learning-oriented interactions appeared to be similar in both tutorial group meetings. As for the concept maps, post-hoc simple effects analyses showed no significant group differences at most time points, p 's $> .05$, Bonferroni-corrected.

Conclusions: Offering standing tutorial group meetings to university students is a recommended solution to break up prolonged SB and encourage more physical activity, while maintaining the learning performance of students.

Physical activity behavior and student mental wellbeing in the vocational education and training setting

Ms. Mara Kirschner¹, Dr. Rianne Golsteijn¹, Ms. Sanne Sijben¹, Dr. Amika Singh³, Prof. Hans Savelberg², Prof. Renate de Groot¹

¹Open University of the Netherlands, Heerlen, Netherlands, ²Maastricht University, Maastricht, Netherlands, ³Mulier Institute, Utrecht, Netherlands

Special Interest Group: L. Other

Sedentary time is high in Dutch vocational education and training (VET) students, approximately 80% of VET students have an unhealthy sedentary lifestyle, a large part of sedentary time is due to sitting in school. Breaking up sedentary behavior is associated with an increase in student mental wellbeing, but research in the VET setting is limited. Therefore, physical activity (PA) patterns in relation to student mental wellbeing in VET students should be investigated, as well as the possibility of using “sit-to-stand” (StS) desks to break up sedentary behavior (SB) in the VET setting.

In a cross-sectional study, the associations between accelerometer-measured PA patterns (SB, low intensity PA (LPA), and moderate-to-vigorous PA (MVPA)) and student mental wellbeing (depressive symptoms and self-esteem questionnaires) in VET students (n=100) was studied. Furthermore, in semi-structured focus group interviews (n=33) the opinions of VET students regarding (1) usage of the standing option of the desks (2) reasons for standing in class (3) experienced effect of standing behind the desk, and (4) fostering future StS desks usage were assessed. Findings were analyzed using deductive content analysis.

Multiple regression analyses showed that higher LPA is significantly associated with lower depressive symptoms ($p=.008$). A similar, but borderline significant association was found for MVPA ($p=.056$). Higher LPA is also significantly associated with higher self-esteem ($p=.026$). SB is not significantly related to student mental wellbeing. Focus group interviews showed that VET students are aware of the potential benefits of using StS desks. However, they need to be actively stimulated and motivated by teachers to use them. In addition, time is needed for standing to become a habit. Thus, because LPA is associated with higher student mental wellbeing, it is important to break-up SB. Therefore, breaking up SB by implementing StS desks may result in higher levels of LPA, which in turn can decrease depressive symptoms and increase self-esteem. To implement such desks in the VET setting, all stakeholders (i.e., students, teachers, schoolboards) should be actively involved in stimulating the healthy behavior of VET students.

S1.08 - Exploring sedentary behavior in Nursing Home residents, June 8, 2021

Chair: Javier Jerez-Roig, Professor, UVIC-UCC

Discussant: Lucy Lewis, Flinders University

Multiple reports had warned governments and the population that the demographic structure from the European countries will be getting older over the next decades. This fact will mark a transition towards an aged society, becoming a huge challenge for the social and health systems and the public resources of every country in Europe. One of the institutions who will have to adapt to the massive demand of long term care will be the nursing homes. Currently Nursing Homes are struggling in changing the actual nursing home paradigm of a social-health care institution to person-centered homes with limited financial resources and lack of formed staff, having to attend to all the needs of a complex population. Nursing home residents are the frailest of our society, with high levels of functional limitations, physical dependence, and with a high prevalence of cognitive impairment.

The evidence showed that nursing home residents are the least physically active of all older adults, and spend an average of 79% of their awake time sedentary. However, sedentary behaviour it's just starting to gain recognition as a risk factor of multiple health-related conditions such as metabolic disorders and diabetes cardiovascular diseases and mortality. Some studies have also shown a relation of sedentary behaviour with sarcopenia, frailty, urinary incontinence, cognitive impairment, depression and social isolation, sometimes independent of physical activity levels in community dwelling older adults. Evidence focused on confirming that sedentary behaviour is a risk factor of multiple health-related conditions in nursing home residents, could lead to a new approach in the interventions to manage the needs of this complex population on the new person-centered homes paradigm.

We aim to present three observational cross-sectional studies from the OsoNaH project; the first one focuses on the association of sedentary behaviour and urinary incontinence (Farrés-Godayol), the second one on the association between sedentary behaviour and loneliness (Molas-Tuneu), and the third one on the association of sedentary behaviour and sarcopenia and frailty (Escribà-Salvans) among nursing home residents. The chair and discussant will critically review the existing work on sedentary behaviour as a health-related risk factor on the current state of evidence, knowledge gaps, and on future research needs and directions.

Is sedentary behaviour associated with urinary incontinence among nursing home residents?

Mr. Pau Farrés Godayol¹, Dr. Eduard Minobes-Molina¹, Ms. Anna Escribà-Salvans¹, Ms. Míriam Molas-Tuneu¹, Mr. Pau Moreno-Martin¹, Prof. Dawn Skelton², Prof. Joanne Booth², Prof. Philippa Dall², Dr. Maria Giné-Garriga^{3,4}, Dr. Javier Jerez-Roig¹

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Special Interest Group: A. Ageing (SIG)

Purpose: This study aims to analyze the association between sedentary behaviour (SB) and urinary incontinence (UI) in nursing home residents (NH).

Methods: A cross-sectional observational study (Clinical Trials NCT04297904) in 5 NH was conducted in the Osona county (Barcelona, Spain). Dependent variable was UI (by Minimum Data Set 3.0 version), and independent variables were absolute time spent sitting in hours (ATS), % of waking time spent sitting (%WTS), absolute time spent upright in hours (ATU), % of waking time spent upright (%WTU) and average duration of SB bouts in minutes (SBB) measured by ActivPAL3 device (AP) during 7 consecutive days. Exclusion criteria were <65 years, living in the NH <6 months, refuse to participate, hospitalization, palliative care and wearing the AP device <7 days. Data were analysed with a confidence level of 95% through the Kruskal-Wallis, the one wayANOVA test and pairwise comparisons with the mean \pm (SD) standard deviation.

Results: The final sample consisted of 88 subjects, 69 (78.4%) women, mean age 85.9SD7.3. In the continent group (CG, n=28,31.8%), mean ATS was 8.75SD1.97, mean %WTS 72.04SD15.24%, mean ATU 3.32SD1.87, mean %WTU 27.95SD15.24% and mean SBB 20.03SD10.95. In the occasionally incontinent group (OIG, n=29,32.9%), mean ATS was 8.99SD1.82, mean %WTS 83.38SD16.45%, mean ATU 1.89SD1.90, mean %WTU 16.62SD16.45% and mean SBB 61.54SD75.59. In the incontinent group (IG, n=31, 35.2%), mean ATS was 9.55SD1.66, mean %WTS 93.46SD12.46%, mean ATU 0.63SD1.19, mean %WTU 6.54 \pm 12.46% and mean SBB 105.52SD49.28. The IG presented a significantly higher mean ATU ($p<0.001$) and %WTU ($p<0.001$) than the OIG and IG. The IG had significantly higher %WTS ($p<0.001$) and SBB ($p<0.001$) than the OIG and CG. There were no significant differences in ATS between groups ($p=0.226$).

Conclusions: NH residents with total or occasional UI spent significantly more time sitting and had larger SB bouts than time spent upright compared to continent residents. ATS was higher in the IG versus the OIG and much more than CG, but differences were not statistically significant. Longitudinal studies with a larger sample are guaranteed to confirm whether SB represents a risk factor for UI in the NH population.

Are psychosocial factors associated with sedentary behaviour in older people living in nursing homes?

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Special Interest Group: A. Ageing (SIG)

Purpose: This study aims to observe possible associations between sedentary behavior (SB) and some psychological conditions such as depressive and anxious symptoms, perceived loneliness, risk of social isolation and perception of quality of life of the nursing homes (NH) population.

Methods: A cross-sectional study (Clinical Trials registration number NCT04297904) was conducted in 5 NH in the Osona region (Barcelona, Spain). The main variables were absolute time spent sitting in hours (ATS) and time spent upright in hours (ATU), % of waking time spent sitting (%WTS) and time spent upright (%WTU), average duration of SB bouts in minutes (SBB) and were recorded during 7 consecutive days using ActivPAL3TM device. Depressive symptoms were assessed with the 15-item Geriatric Depression Scale, anxious symptoms with Hospital Anxiety and Depression Scale, perceived loneliness with 6-item De Jong Gierveld Loneliness Scale, social network with Lubben Social Network Social Scale, and EuroQoL-5 dimension was used for the measurement of quality of life (QoL). All the variables were analyzed using the Mann Whitney U test, except the variable "absolute time spent sitting (hours)" which was analyzed using the Student's t-test for independent samples.

Results: Of the 65 individuals who initially were able to answer questionnaires, 16 (24.6%) were excluded due to their refusal to wear the ActivPAL3TM device. Among the 49 included participants, mean age was 84.3 (± 7.71) and 37 (75.5%) were women. Although no statistically significant associations were found, there was a tendency for residents with emotional loneliness to spend more time in SB ($p=0.072$) compared to those without distress: 9.2 (interquartile range (IQR): 8.2-10.4) and 8.5 (IQR: 7.1-10), respectively; people who perceived their QoL as worse ($p=0.072$) spent longer periods in SB: 34.5 min (IQR: 15.6-79.4) and 16.6 (IQR: 12.3-31.17), respectively.

Conclusions: Residents with higher levels of loneliness have longer periods of SB and the ones with worse perception of QoL presented with larger SB bouts. The differences were not statistically significant, although for the variables QoL and loneliness, values were close to significance. It would be convenient to increase the sample to further explore the association between SB and psychosocial factors among NH residents.

Do older people with sedentary behaviour living in nursing homes fall less?

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Special Interest Group: A. Ageing (SIG)

Purpose: This study aims to analyse the association of falls and sedentary behaviour (SB) in older people who live in nursing homes (NH).

Methods: A cross-sectional observational and longitudinal study (Clinical Trials NCT04297904) in 5 NH was conducted in the Osona county (Barcelona, Spain). The main variables were absolute time spent sitting in hours (ATS), % of waking time spent sitting (%WTS), absolute time spent upright in hours (ATU), % of waking time spent upright (%WTU) and average duration of SB bouts in minutes (SBB) measured by ActivPAL3 device (AP) during 7 consecutive days. A retrospective register of falls from the year prior to the baseline (2019-2020) was carried out. Exclusion criteria were <65 years, live in the NH <6 months, refusal to participate, hospitalization, palliative care and wearing the AP device <7 days. We used the Mann Whitney U test, except the variable "absolute time spent sitting (hours)" which was analyzed using the Student's t-test for independent samples.

Results: The final sample consisted of 93 subjects, 74 (79.6%) women, mean age 85.75SD7.4. The falling residents group (n=39,41.9%), mean ATS was 8.82SD1.6, mean %WTS 80.52SD0.18%, mean ATU 2.23SD2.12, mean %WTU 19.47SD0.18% and mean SBB 55.25SD57.71. In the no falling residents group (n=54, 58.1%), mean ATS was 9.1SD1.94, mean %WTS 83.79±0.17%, mean ATU 1.88SD2.1, mean %WTU 16.21SD0.17% and mean SBB 65.80SD65.23. No statistically significant associations were found between falls and SB variables: ATS (p=0.353), %WTS (p=0.559), ATU (p=0.538), %WTU (p=0.559) and SBB (p=0.503). At six months, the residents' falls were recorded: 31 (33.3%) individuals fell of which 23 (74.2%) were women. The results also showed no statistically significant association between falls and the CS variables: %WTS (p=0.566), ATU (p=0.813), %WTU (p=0.566) and SBB (p=0.788). The ATS variable (p=0.018) and the falls variable showed a higher significance at six months.

Conclusions: Residents with prolonged periods of SB, fall more than those residents who spend less time in SB. There are differences between the two groups but no statistically significant differences between the two variables. More longitudinal studies with larger samples should be conducted to find more significant data including falls prevention.

**O1.11 - Lifestyle behaviors and cognition across the life course,
June 8, 2021**

Modelling integration and relevance of movements and cognitive task performance: A systematic review and meta-analysis

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Special Interest Group: L. Other

Purpose: The aim of this systematic review and meta-analysis was to evaluate the effects of movement-based interventions during academic time, based on the level of integration with and relevance to the learning content, on children's and adolescents' cognitive processing (e.g., executive function, selective attention), memory (e.g., free recall), behavioral control, and academic achievement.

Methods: Intervention studies during academic time by the classroom teacher were grouped into: a) high integration–high relevance (e.g., movements occurring simultaneously and are meaningfully related with the learning task, while academic concepts are explained through movements), b) high integration–low relevance (e.g., movements occurring simultaneously with the learning task but are not meaningfully related with the learning task – usually known as integrated activities), c) low integration–high relevance (e.g., subtle movements occurring before or after the learning task but are meaningfully related with the learning task – usually known as gestures), and d) low integration–low relevance (e.g., movements occurring before the learning task and are not meaningfully related with the learning task – usually known as activity breaks). Risk of bias was assessed using the Cochrane Tool for Quality Assessment for randomized controlled trials. Meta-analyses were conducted per outcome for acute and chronic studies. A total of 79 studies involving 26,186 participants (2-18 years) were included.

Results: There was a large effect ($ES = 0.94$) of chronic interventions with high integration-high relevance (10 studies; 850 participants), and a medium effect ($ES = 0.61$) with high integration-low relevance (8 studies; 933 participants) on memory performance. Chronic interventions (15 studies; 2,956 participants) with high integration-low relevance had a small effect ($ES = 0.30$) on academic achievement. Both chronic ($ES = 1.14$) and acute interventions ($ES = 1.15$) with low integration-low relevance had large effects on behavioral control measures. No effects were found for cognitive processing (neither for chronic nor for acute studies).

Conclusions: The theory-driven mapping of studies showed a nuanced pattern of effects of acute and chronic classroom-based movement strategies on memory, behavioral control and academic achievement. Consistencies were identified and explained referring to arousal, attention, cognitive load, and embodiment theories.

Development of a cognitively enriched walking program for older adults: a co-design study with experts and end users

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Special Interest Group: A. Ageing (SIG)

Purpose: Research in controlled laboratory settings shows that physical activity programs enriched with cognitive challenges enhance the benefits of physical activity on cognitive functioning in older adults. The current research aimed to translate these lab-based findings and to develop a real-life cognitively enriched walking program. This was done by investigating (a) which cognitive tasks are most suited for cognitive enrichment of a walking program for older adults, and (b) how to embed these cognitive tasks in a walking program to make it feasible, attractive and scalable for the older population (65+).

Methods: A co-design process was used with consecutive input from 34 academic experts and 535 end users. First, the expert panel discussed the fundamentals of a real-life cognitively enriched walking program in an online three-round Delphi procedure. Next, end users provided feedback and suggestions on what the experts concluded, and gave more insight into their preferences and concerns in an online/telephone-administered survey. Closed-ended questions were analyzed with descriptive statistics and open-ended questions were coded and analyzed using content analyses.

Results: Combined input of the experts and end users revealed that it would be most beneficial to provide a range of cognitive tasks to choose from. Each of these cognitive tasks should provide as much variation and differentiation as possible, should be implemented with increasing levels of difficulty and should be integrated in the walk. In addition, it was recommended to divide the walk into three parts: (a) 5-10 minutes brisk walking, (b) cognitive tasks for most of the walk, approximately 15-20 minutes per 30 minutes of walking, and (c) 5-10 minutes spontaneous small task or rest and relaxation. Other recommendations were to strive to a minimal session frequency of twice a week, to include competition occasionally and carefully, to ensure safety and to keep the walks fun.

Conclusions: This study developed a real-life, cognitively enriched walking program for older adults, based on a co-design process. Further research will explore the effectiveness and feasibility of the program before it will be implemented on a large scale to enhance the benefits of physical activity on cognitive functioning in older adults.

“Walk your brain”- How do older adults perceive cognitively enriched walking? Results from walk-along sessions

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Special Interest Group: A. Ageing (SIG)

Purpose. Combining physical and cognitive activity is shown to have a synergistic impact on brain plasticity in older adults. However, to date this has mainly been studied in controlled laboratory conditions. Using a co-design process we developed a real-life cognitively enriched walking program for older adults by means of three Delphi rounds with 34 academic experts and a survey with 535 end users. The current study aimed to examine older adults' perceptions of this cognitively enriched walking program including 32 cognitive tasks.

Methods. Unfortunately, due to COVID-19 and restrictive measures, planned group walk-along sessions with 40 older adults (in groups of 10) had to be cancelled. Alternatively, 80 university students of physical education and movement sciences at Ghent University were asked to each conduct walking-sessions with two older adults (> 65 years) (together or separately). The students were instructed to walk at least 1 km, try out three randomly assigned cognitive tasks, and devote at least 15-20 minutes to the tasks during the walk with older adults. For each walk-along session students filled out an observational report (e.g. weather conditions, adverse events), a survey with seven closed-ended questions to evaluate older adults' perceptions, and two open-ended questions to explore potential suggestions for improvement.

Results. In total 160 older adults performed a walk along, supervised by a total of 80 students. Each cognitive task was trialed by at least 14 different older adults. Results are currently being analysed and will be presented at the conference. Differences in perceptions of attractiveness, task challenge, self-efficacy, suitability, safety, age-appropriateness, and positive influence on the brain for each of the 32 tasks will be examined. Additionally, age and gender differences will be explored. Finally, a synthesis of recurring suggestions on how to improve the program will be made based on students' observations and older adults' answers to open-ended questions.

Conclusions. This study is the first to pilot test a real-life, cognitively enriched walking program for older adults which was created following a co-design process. Findings will inform the final cognitively enriched walking program which will be evaluated in an RCT by the end of 2021.

Sleep-related breathing disorders are related to poorer academic performance in children with overweight/obesity, yet not with brain volumes

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Special Interest Group: G. Children and families (SIG)

Purpose: Children with obesity are prone to suffer from sleep-related breathing disorders (SRBD) and to have impaired brain health. To date, no studies have focused on the association between SRBD and brain health in this population. This study aimed to examine the association of SRBD risk with brain health, including academic performance and brain structure (i.e., total gray and white matter volumes, total brain volume, and gray matter volume in the right and left hippocampus) in children with overweight/obesity.

Methods: One-hundred and nine children (10.0±1.1 years old, 45 girls) with overweight/obesity were included. SRBD risk was evaluated via the Spanish version of the Pediatric Sleep Questionnaire. Academic performance was assessed by the Woodcock-Muñoz standardized test and school grades. Brain structure was assessed by magnetic resonance imaging. Hierarchical linear regression analyses were performed. We additionally explored mean differences in academic and brain outcomes between children with high vs low risk of SRBD using ANCOVA analyses.

Results/findings: Risk of SRBD was not associated with academic performance measured by standardized tests (all $\beta < -0.160$ and $P > 0.076$). For school grades, the risk of SRBD was significantly associated with overall academic performance, i.e., grade point average, and particularly with natural and social science grades ($\beta = -0.226$, $P = 0.007$, $\beta = -0.269$ and $P = 0.024$, respectively). Furthermore, those children with high risk of SRBD (SRBD score > 0.33) showed lower performance on grade point average, and specifically with writing, Spanish language and natural and social science compared to peers grouped at low risk of SRBD. No associations were found between the risk of SRBD and the remaining school grades variables (all $\beta < -0.188$ and $P > 0.065$). Risk of SRBD were not associated with total brain volume or hippocampal gray matter volume (all $P > 0.05$).

Conclusions: Our study shows that risk of SRBD was associated with lower academic performance at school whilst no associations were found with the brain structure in children with overweight/obesity. This study is relevant from a public

health perspective to enhance brain health by targeting SRBD. Further randomized controlled trials should contrast these findings.

Moving maths – Effects of physically active maths lessons on children's maths performance and maths-related affective factors

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Special Interest Group: L. Other

Physically active learning (PAL) has been actively implemented as a new teaching method, as physical activity has shown to benefit children's cognitive and academic performance, especially maths performance. However, it is not known, what type, time and frequency of PAL is the most suitable or optimal for children from the learning perspective. The purpose of this study was to examine the effects of the physically active maths lessons on children's maths performance and maths-related affect.

Methods: 398 Finnish children (mean age 9.3 y., 49% boys) from 13 school in Central Finland participated in a six-month (October 2019 - March 2020), school-based cluster-randomized controlled trial. The intervention included three intervention groups following different teaching Methods: Group 1 (20 minutes of physical activity integrated into maths curriculum goals in each 45 min lesson), Group 2 (two five-minute physically active breaks in each 45 min lesson) and Group 3 (traditional teaching). Before and after the intervention, curriculum-based maths performance was assessed with a custom-made test battery, while affective traits (enjoyment, self-efficacy, and anxiety) of maths were measured with a self-report questionnaire. The intervention effects were tested by covariate-adjusted linear mixed effect models with school classes as random effects.

Results: The change in maths performance, maths enjoyment or maths self-efficacy did not differ between the intervention groups. Maths anxiety in learning situations increased in Group 1 ($p=0.045$), while not in other groups. Subgroup analyses revealed that while maths anxiety increased in children in the lowest and intermediate tertiles of motor skills, the maths anxiety decreased in children in the highest motor skills tertile ($p=0.041$).

Conclusions: Physically active maths lessons did not affect maths performance, enjoyment, or self-efficacy. However, the PAL in which maths tasks include both mathematical and motor challenges may reduce the maths anxiety among children with high motor skills, while increase it in motorically less skilled children. When implementing PAL, the children's motor skills should be taken into account, and the physically active maths tasks are recommended to be differentiated according to both mathematical and motor skill levels.

A 4.5-month physical exercise program induces brain activation changes in children with overweight/obesity: The ActiveBrains project

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Special Interest Group: G. Children and families (SIG)

Purpose: To investigate whether a 4.5-month exercise program induces changes in brain current source density underlying working memory processes in children with overweight/obesity.

Methods: Sixty-seven children (10.0 ± 1.1 years) participated in the present randomized controlled trial and were randomly allocated to an exercise group (EG; N = 35) or a wait-list control group (CG; N = 32). The EG participants were instructed to participate in the exercise program at least 3 times/week (90 min/session). Electroencephalography was performed during a low and high cognitive-demanding Delayed Non-Match-to-Sample (DNMS) task that assessed working memory in three phases: encoding, maintenance and retrieval. Current source density ($\mu A/mm^2$) estimations at pre- and post-intervention were obtained using sLORETA. The effects of exercise program on current source density were tested with an independent groups analysis.

Results: Both groups significantly presented shorter reaction times at post-intervention in both DNMS conditions. The EG showed a higher increment of the current source density from pre- to post-intervention with respect to the CG in temporal and frontal areas during retention of 2nd stimuli (peak t = from 3.4-3.8, cluster size [k] = from 11- 39); in frontal areas during retention of the 3rd stimuli (peak t = from 3.7-3.9, k = from 15-26); and in temporal and occipital areas during retention of the 4th stimuli (peak t = from 2.7-4.3, k = from 13-101) of the high working memory condition. There was not a significant differential change between groups during the maintenance and retrieval phases and neither in the low working memory condition.

Conclusions: A 4.5-month exercise program induces brain activation changes as measured by current source density during working memory processes in children with overweight/obesity. Children from the EG, to a higher extent than those from the CG, significantly increased the current source density of a broad network of brain areas primarily of the temporal and frontal lobes during a working memory task. These effects were observed during the encoding phase of the high load condition, suggesting that a long-term practice of physical activity might enhance the capacity to process and store information during working memory processes.

**O1.12 - Addressing economic inequalities across lifestyle behaviors,
June 8, 2021**

The potential of food environment policies to reduce socioeconomic inequalities in diets and to improve healthy diets among lower socioeconomic groups: an umbrella review

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Special Interest Group: I. Socio-economic inequalities (SIG)

Purpose: Socioeconomic inequalities in diets are common, unfair and avoidable and must be tackled to achieve agreed nutrition and NCD goals. Governments may implement food environment policies like those featured in the acknowledged Healthy Food Environment Policy Index (Food-EPI), a framework encompassing seven evidence-based policies. The equity impact of these policies has however not been appraised. The objective of this umbrella review is to critically assess the diet-related equity impact of six Food-EPI policies and identify knowledge gaps. This is important because Food-EPI projects may influence policy making and therefore also socioeconomic inequalities in diets.

Methods: We undertook a systematic search for systematic literature reviews in seven academic data bases in September 2019, combining search terms on: Policy interventions; Food, diet and health; Inequality; Study type. Eligible systematic reviews included relevant policy interventions of any quantitative study design; looked at groups from the general population; reported outcomes according to socioeconomic status; assessed diet-related outcomes and were published in English in the past 15 years (2004-2019). Results were analyzed and presented narratively according to policy type and overall direction of results on inequalities (increase/ reduce/neutral/inconsistent effects on inequalities). AMSTAR-2 was used to assess the reviews for bias and quality.

Results/findings: 16 systematic literature reviews were included, encompassing 169 unique relevant primary studies. They covered five Food-EPI policy areas: food prices (n=13), food in retail (n=4), food labelling (n=3), food provision (school food policies) (n=2), food composition (n=2). Based on AMSTAR 2, quality was mainly low or critically low. The most robust evidence base was for food pricing, suggesting that taxation of unhealthy food may reduce socioeconomic inequalities in diets. For all other policy areas, the evidence base is limited. No results suggest that food environment policies increase socioeconomic inequalities in diets, but for several policy areas results are inconclusive.

Conclusions: Current research largely fails to provide evidence on equity impacts of food environment policies. There is an urgent need to design and undertake research that can fill this knowledge gap, which is necessary for informing the development of effective and equitable public health policies that “leave no one behind”.

Determinants of Healthy and Sustainable Food Choices in Parents with a Lower and Higher Socio-Economic status: A Focus Group Study

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Special Interest Group: I. Socio-economic inequalities (SIG)

Purpose: Establishing healthy and sustainable dietary habits in childhood is necessary for the prevention of obesity, as well as for the growing pressure on our ecosystems. Parents are the most important actors in affecting dietary behaviors of their children. Even though determinants of healthy food choices among parents have been studied, we still lack specific insight among families with lower socio-economic status (SES) as well as knowledge on determinants of sustainable food choices. To our knowledge, this is the first study that aims to investigate differences in individual and environmental determinants of both healthy and sustainable food choices among lower and higher SES parents.

Methods: A focus group study was conducted among Belgian lower and higher SES parents. A semi-structured interview guide was developed based on the socio-ecological model. The audio taped interviews were transcribed, and a thematic analysis of the transcripts was conducted. Due to covid-19 restrictions, data saturation was only reached for higher SES parents, more focus groups are planned for spring 2021 among lower SES parents.

Preliminary Findings: Fifteen focus groups (n=75) were conducted, including six among lower SES (n=20), and nine among higher SES parents (n=55). Most parents in both SES groups indicated sustainable food choices to be less important than healthy choices. Lower SES parents reported the price of healthy foods as a main barrier, along with knowing that their children will not eat certain foods, and not knowing which recipes to make and how. Higher SES parents mentioned time as main barrier to choose healthy. Both SES groups indicated a lack of knowledge on sustainable foods, its higher price, and personal preferences as important barriers. Additionally, busy lives and a lack of time hinders sustainable choices among higher SES parents while lower SES parents seemed less open to change their meat-eating habits.

Conclusions: Given the mentioned barriers, we can conclude that for higher SES parents an intervention focusing on sustainable food choices would be most beneficial, whereas for lower SES parents interventions should take into account price as main determinant, as well as knowledge, skills and motivations for both healthy and sustainable food choices.

Impact of the COVID-19 pandemic on the engagement of disadvantaged parents in the PrEgnanCy and eArly childhood nutrition trial (ECAIL)

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Special Interest Group: I. Socio-economic inequalities (SIG)

Purpose: The COVID-19 pandemic is being coupled with a deep socioeconomic crisis worldwide, along with a dramatic increase of food insecurity. The overarching aim of the ECAIL study, which started in 2017 in Northern France, is to test the hypothesis that an intervention combining nutrition education, social support and healthy foods made available at a reduced price, has an impact on diet and growth of young children from disadvantaged families. The objective of the present intermediate analysis was to compare the number of social vulnerabilities of eligible and participating families before and since the beginning of the pandemic.

Methods: ECAIL is an ongoing randomized controlled trial, implemented at the Lille University Hospital. Pregnant women (objective n=800) from disadvantaged backgrounds are being identified at the maternity ward during their prenatal care, then recruited and followed up by dietitians at home, until their child is aged 24 months. Inclusion criteria include any of the following indicators of social vulnerability: social or medical benefits, unemployment, financial hardship, housing insecurity, or social isolation. Families in the intervention arm are offered the various components of the program, whereas those in the control arm receive usual care. Due to the pandemic, the recruitment of pregnant women in the trial stopped in March 2020 and resumed 6 months later. The eligibility rate, the number of social vulnerabilities and the participation to the trial were compared before and after the beginning of the pandemic. Preliminary

Results: 29.6% of the women screened were deemed eligible before the pandemic started vs. 35.9% since then, with eligible families more likely to experience ≥ 3 vulnerabilities since September (24.0%) than before March 2020 (18.9%). Eligible women participating to the trial have experienced more social vulnerabilities than their non-participating counterparts. Drop-outs have remained rather low (42 out of 248 families included).

Conclusions: The socioeconomic crisis resulting from the pandemic is reflected in the ECAIL trial by the increase of both the eligibility rate and the number of social vulnerabilities experienced by eligible women. This does not seem to impair their engagement in this interventional research; indeed, adherence to this trial has remained stable.

Impact of life-events on sedentary behaviour among women from disadvantaged neighbourhoods

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Special Interest Group: I. Socio-economic inequalities (SIG)

Background: Not much is known about the effect of life-events, specifically parenthood and change in employment, on women's sedentary behaviour (SB). The onset of motherhood can influence employment status which may subsequently affect SB. Women from disadvantaged neighbourhoods are at particular risk of poor health, volatile employment conditions, and sedentary lifestyle. Among women living in socioeconomically disadvantaged neighbourhoods, this study aimed to determine the association between changes in parental and employment status with sitting, television (TV), and computer time. A second aim was to examine employment status as a moderator between change in parental status and SB.

Methods: Women from socioeconomically disadvantaged areas in Victoria, Australia (age- 18-45 years; at baseline (n=4,349), three years later (n=1912) and five years later (n=1560) self-reported SB and life-events, classified as; change in parental status (no children, number of children remained unchanged, first child/ additional child/ren, fewer children <18 years) and change in employment (remained full-time, remained part-time/not working, decreased working hours, increased working hours). Multilevel modelling adjusted for confounding determined the impacts of life-events on sitting (linear) and TV and computer time (negative binomial). Separate models with interactions terms were used to test the moderator.

Results: Compared to those with no children, less sitting and computer time was observed in women whose number of children remained unchanged, those giving birth to their first child/additional child/ren, and those with fewer children, and less TV time was observed among women who had given birth to their first child/additional child/ren. Compared to those who remained full-time, sitting and computer time was lower for women remained part-time workers/not working, decreased working hours, and increased working hours. Employment status was not a significant moderator of the association between change in parental status and SB.

Conclusions: Among women from disadvantaged neighbourhoods, declines in SB were observed amongst those experiencing life-events. Motherhood appeared to decrease the SB, therefore interventions to decrease SB could target women with no children. Future studies on change in occupation (e.g., non-manual to manual jobs) and its impact on SB are warranted.

The influence of neighbourhood on the association between children's lifestyle patterns and the development of overweight

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Special Interest Group: I. Socio-economic inequalities (SIG)

Purpose: The aim of this study was to examine the relative contribution of children's lifestyle patterns to the development of childhood overweight, and to explore the influence of children's neighbourhood as an alternative reflection of socio-economic position.

Methods: We included 1818 children participating in the GECKO Drenthe cohort, with information on at least one lifestyle factor between ages 3-6 and data on measured weight and height at the age of 10. Diet was assessed by a Food Frequency Questionnaire, physical activity (PA) by accelerometry (Actigraph GT3X), and other lifestyle factors by questionnaires. Lifestyle patterns were defined using principal component analysis. Height and weight were measured to calculate age- and sex specific standardized BMI z-scores. Linear- and logistic regression models, taking into account socio-economic position, were performed to examine the association between the lifestyle patterns and the development of overweight. In addition, geographically weighted regressions (GWR) were used to explore whether associations were consistent across the study area.

Results: Three lifestyle patterns were identified: 1) 'activity pattern' (low sedentary time and high moderate-to-vigorous PA), 2) 'high sleep/low screen time' and 3) 'healthy diet and high outdoor play'. No effect of the 'activity' pattern on childhood overweight was found (all $p > 0.05$). In contrast, the 'high sleep and low screen time' pattern was associated with a lower zBMI ($B[95\%CI] = -0.07[-0.11; -0.03]$ SD) and lower odds to become overweight ($OR [95\%CI] = 0.77 [0.65; 0.91]$) at 10 years of age. Additionally, the 'healthy diet and outdoor play' pattern was associated with a lower zBMI ($B[95\%CI] = -0.04 [-0.08; -0.001]$ SD), but not significantly with less overweight ($p > 0.05$) at 10 years. The GWR showed that the association between lifestyle and the development of overweight varied across the study area.

Conclusions: These preliminary results show that the lifestyle patterns of 'low screen time and high sleep' and 'healthy diet and high outdoor play' seem favourable in the prevention of childhood overweight. The geographical differences suggest that there are additional factors in the child's neighbourhood that influence the development of childhood overweight.

“It defeats the purpose of what sport is all about”: perspectives on fast food, gambling, and alcohol sponsorship in elite sport from Australian sporting fans

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Special Interest Group: H. Policies and environments (SIG)

Aim: To explore adults' perceptions of sponsorship of unhealthy food, alcohol and gambling products ('unhealthy commodities') in elite sport, acceptability of policy options to restrict them, and who was responsible for enacting them.

Methods: Two sets of four focus groups were conducted in Sydney CBD and Western suburbs. Seven to eight participants were recruited for each group, to provide a range of age, gender, and socioeconomic status. The first four focus groups explored broad marketing to children concepts, focusing on unhealthy food and beverages, and identified specific areas of focus for the next round. The second set of four focus groups explored in detail perspectives of sport sponsorship of unhealthy food, alcohol and gambling, and policy options to restrict them, as themes arising from the first set, and targeted recruitment to frequent sport spectators, including parents and non-parents.

Results: Participants recognised the commercial benefit of sport sponsorship, while noting the incongruity of associating unhealthy commodities with elite sport. Support for restricting sponsorship was closely tied to the perceived harm of product, with gambling viewed as having the most negative health impacts, followed by alcohol and fast-food. Sport sponsorship and sport marketing was more persuasive now than ever before, due to the integration of advertisements into broadcasted sport, and immediate access of fast-food or betting through mobile applications. There was greater support for policy measures that reduced the exposure of unhealthy commodities to at-risk groups (i.e. children), rather than banning particular products altogether. Responsibility of enacting changes sat with the government and sports associations.

Conclusions: Australian sport spectators were supportive of policies that limited the exposure of children to gambling, fast-food and alcohol through sport sponsorship. Participants were concerned about the persuasiveness of marketing and harms that may arise from the behaviours encouraged by marketing, particularly from gambling.

**O1.13 - Population-level intervention research to promote health and
active travel,
June 8, 2021**

Push and/or pull? A systematic review and meta-analysis of studies evaluating the effectiveness of 'carrot', 'stick', and combined population-level interventions on modifying travel behaviour

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Special Interest Group: H. Policies and environments (SIG)

Purpose: This systematic review and meta-analysis aimed to compare the effectiveness of positive ('carrot') strategies, negative ('stick') strategies, and a combination of the two on modifying travel behaviour.

Methods: Nine databases were searched for controlled before-and-after studies of population-level interventions and travel behaviour (e.g. driving, active travel, public transit, walking, and cycling) from adults in the general population. Interventions were categorized as carrots (e.g. new bike share programs), combined carrot and stick (e.g. traffic calming), or stick interventions (e.g. congestion charging) by whether gains or losses of functions could occur (how the intervention seeks to affect behaviour). Harvest plots were used to visually summarize the findings weighted by study quality as determined using the Effective Public Health Practice Project tool. Where possible, outcomes were converted into standardized mean differences (SMD) and random-effects meta-analyses were conducted.

Results/findings: We extracted data from 83 publications reporting 98 interventions. From these, we identified 20 intervention types and 8 function categories. The majority of interventions were carrots (n=64), followed by carrot and stick (n=17) and stick (n=17). Most evaluations were conducted in North America and Europe on a city-wide or community-level scale. Harvest plots demonstrated that most evaluations, particularly those classified as of higher quality, found changes in favour of the intervention. Results for carrot interventions, however, were less consistent than for stick or combined interventions. This was consistent with findings from the meta-analysis, which were statistically nonsignificant but had point-estimates of greater magnitude for driving outcomes for sticks (SMD -0.21; 95%CI -0.43, 0.01) and combined carrot and stick interventions (-0.17; -0.65, 0.31) compared to carrots (-0.09; -0.21, 0.03). Likewise, for active travel outcomes, combined carrot and stick interventions had a higher SMD (0.60; -0.44, 1.63) compared to carrot interventions (0.10; -0.06, 0.25).

Conclusions: This is the first review to compare whether positive, negative, or combined strategies differ in effectiveness on changing travel behaviour, which can aid policymakers in designing sustainable transportation policies. Further research is needed for interventions with a stick component, which suggest greater effectiveness yet remain less well-studied, possibly because they are less conducive to experimental manipulation.

What works in developing guidance for, designing, commissioning and implementing environmental interventions to promote active travel? A systematic review and qualitative synthesis

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Special Interest Group: H. Policies and environments (SIG)

Purpose: Infrastructure for active travel (walking and cycling) is receiving increasing attention as an important way to promote physical activity and improve health. However, their design and implementation often brings about significant challenges. We aimed to synthesise stakeholders' views and experiences of developing guidance for, designing, commissioning and implementing environmental interventions to promote active travel.

Methods: Eight electronic databases were searched, with no restrictions, complimented by hand searching to identify studies containing qualitative data analysed using a qualitative approach (e.g. interviews, focus groups) from stakeholders with experience of designing, commissioning or implementing environmental interventions to promote active travel or relevant guidance. Two reviewers independently assessed articles for eligibility. Risk of bias of individual studies and confidence in the review's findings were assessed, with 25% checked by a second reviewer. Studies were synthesised using thematic analysis using a 'solutions lens'.

Findings: Of the 22,239 articles identified, 37 studies met the inclusion criteria. Twenty studies focused on infrastructure promoting walking and cycling, fourteen on cycling and three on walking. Most were conducted in a limited number of high-income countries. Overarching themes were: 1) identifying the right actors to bring about change; 2) initiating and maintaining collaborations; 3) factors influencing choice of infrastructure; 4) securing and managing resources. Key actors were multi-sectoral, from across all levels of the decision-making process who had an interest in active travel and ability to influence change. Their collaboration was essential to gaining resources, sharing knowledge and meeting local needs. Effective communication was through political and administrative channels, advocacy and promotional activities, and co-design with stakeholders and communities. Actors should recognise and act on opportunities for upgrading or new infrastructure, should be sensitive to context (e.g. demographic, political, socio-cultural), and implemented with other complimentary behavioural interventions. Persuasive arguments included highlighting evidence for health and economic benefits, trialling of temporary infrastructure, using personal testimonies and evidence from other contexts.

Conclusions: Our findings will assist a wide range of stakeholders to successfully navigate the process of implementing infrastructure and inform policy. Further research is required to understand techniques, methods and processes that stakeholders used in a range of settings.

Prevalence and geographic variations of physically active and sedentary travel of working-age adults: evidence from the greater Tokyo metropolitan area

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Special Interest Group: H. Policies and environments (SIG)

Purpose: Increasing physical activity in daily travel can contribute to the prevention of non-communicable diseases. Understanding how prevalent active and sedentary travel behaviours are and how they are distributed is critical in developing future strategies, but robust evidence does not seem to exist in Asian cities. We examined the prevalence and geographic variations of active and sedentary travel in greater Tokyo.

Methods: Data were provided by 412,253 working-age adults (aged 20–64 years) from the fifth Greater Tokyo Metropolitan Area Household Travel Survey. Participants reported their travel behaviours using a 24-hour travel diary. They were categorised into those engaged in active travel (≥ 30 min/d in active modes (walking and cycling) and 0 min/d of car use) or not and those engaged in sedentary travel (0 min/d in active modes and ≥ 60 min/d in cars) or not. Variations in travel behaviours were examined across four distinct geographic regions that varied by population density.

Results: The overall prevalence of active travel was 40% and that of sedentary travel was 11%. The prevalence of active and sedentary travel differed between regions: it was 50.2% and 4.4% in inner metropolitan (mean population density: 161 persons/ha); 45.3% and 8.2% in higher-density outer metropolitan (92 persons/ha); 35.4% and 13.4% in lower-density outer metropolitan (37 persons/ha), and 20.1% and 21.7% in peri-urban areas (6 persons/ha), respectively. Multilevel regression analysis found that each 10 persons/ha increment in population density was associated with 18% higher odds of engaging in active travel (95%CI: 1.16, 1.20) and 13% lower odds of engaging in sedentary travel (95%CI: 0.86, 0.88).

Conclusions: In the greater Tokyo metropolitan area, 40% of working-age adults met physical activity guidelines through active travel without any car use. However, there were gradients in the prevalence of active and sedentary travel according to population density, which are likely to be reflective of built-environment and transport-system variations. Our findings suggest that residents of peri-urban areas are at greater risk of non-communicable diseases. Such evidence can inform the public health, transport, and urban planning sectors to develop area-specific initiatives to promote physically active lifestyles for the prevention of non-communicable diseases.

The impact of corona-lockdown on physical activity and sedentary behaviour in secondary school staff: a prospective cohort study

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Special Interest Group: L. Other

Purpose: Mid-March 2020, Belgium went in lockdown to combat the COVID-19-pandemic, which resulted in drastic changes in people's work- and lifestyle. Especially physical activity (PA) and sedentary behaviour (SB) may have been affected. As low PA and high SB levels are associated with overweight and obesity, which have an apparent link with COVID-19 illness, it is important to investigate the impact of this lockdown on people's PA and SB.

Methods: This prospective cohort study is part of a larger longitudinal study, assessing PA and SB levels of Flemish secondary school staff throughout the 2019-2020 school year. Fortunately, we were able to compare one of our measurements, conducted between March 23 and April 7, 2020 (ten days after the installation of the lockdown measures) with a pre-lockdown (baseline) measurement, conducted between January 27 and February 11, 2020. Validated questionnaires were used to assess participants' PA and SB. Mixed modelling was applied in R to evaluate the impact of the lockdown on PA and SB.

Results: Six hundred seventy-five secondary school employees (76.1% females; 43.9±10.2years; BMI of 25.2±4.4kg/m²; 90.4% teachers, 7.5% principals, 2.1% other school staff) were included. Significant increases were found for total PA (+102min/week; p<0.05), household PA (+281min/week; p<0.001) and leisure time PA (+136min/week; p<0.001), whereas decreases were observed for work-related PA (-264min/week; p<0.001) and transport-related PA (-38min/week; p<0.001). In contrast to walking and vigorous PA (showing no differences over time), participants were more moderately physically active (+194min/week; p<0.05) during the lockdown period. Significant increases were found for total SB (+864min/week; p<0.001), work-related SB (+583min/week; p<0.001) and leisure time SB (+551min/week; p<0.001), whereas a decrease was observed for transport-related SB (-284min/week; p<0.001).

Conclusions: Despite health beneficial increases in PA during the lockdown period, our findings equally show unhealthy increases in SB. Promoting a physically active and non-sedentary lifestyle is highly important during the current COVID-19-pandemic as, besides their association with overweight and obesity and its related co-morbidities, increased PA and decreased SB may positively affect the immune system.

Making sense of the evidence in population health intervention research: building a dry stone wall

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Special Interest Group: H. Policies and environments (SIG)

Purpose: To tackle population health challenges, we must address the fundamental determinants of diet and activity patterns. Systematic reviews frequently conclude that the available evidence about the effects of environmental and policy interventions is too diverse, flawed or inconclusive to support a more general conclusion about what should be done. However, merely increasing the supply of intervention studies is not enough. The pivotal link between research and policy or practice should be the cumulation of insight from multiple studies. In spite of all the developments in quantitative methods for evidence synthesis, however, we struggle to derive meaningful generalisable inferences to guide and support public health action.

Methods: We review theoretical, methodological and case study material from a variety of disciplines and propose a more eclectic, flexible and reflexive approach to building and interpreting the evidence.

Findings: If conventional evidence synthesis can be thought of as analogous to building a wall, then we can increase the supply of bricks (the number of studies), their similarity (statistical commensurability) or the strength of the mortar (the statistical methods for holding them together). However, many public health challenges seem akin to herding sheep in mountainous terrain, where ordinary walls are of limited use and a more flexible way of combining dissimilar stones (pieces of evidence) may be required. This would entail shifting towards generalising the functions of interventions, rather than their effects; towards inference to the best explanation, rather than relying on binary hypothesis-testing; and towards embracing divergent findings, to be resolved by testing theories across a cumulated body of work.

Conclusions: We should look beyond simple notions of 'interventions', search for patterns and embrace the mess in evidence synthesis in order to better understand what makes for an effective public health strategy. In this way we might channel a spirit of pragmatic pluralism into making sense of complex sets of evidence, robust enough to support more plausible causal inference to guide action, while accepting and adapting to the reality of the public health landscape. The traditional art of dry stone walling can serve as a metaphor for the more 'holistic sense-making' we propose.

HealthyMigrantMoms – how an existing health and pregnancy app could be adapted and modified to support a healthy lifestyle in migrant women in Sweden

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Special Interest Group: I. Socio-economic inequalities (SIG)

Purpose: Excessive and inadequate gestational weight gain is associated with adverse pregnancy outcomes and migrant women is an especially vulnerable group. In Sweden, approximately 20% of pregnant women are foreign born and the majority are Arabic- or Somali speaking. Further, most pregnant women regularly visit maternity healthcare, which makes it an important arena to promote a healthy lifestyle. We have previously shown that a Swedish smartphone app can improve dietary habits and reduce weight gain during pregnancy (HealthyMoms). To also reach migrant women, the app needs to be translated and adapted. Therefore, the aim of this study was to explore maternity healthcare staffs' working routines and views on how the HealthyMoms app could be modified to best reach Arabic- and Somali speaking pregnant women (i.e. The HealthyMigrantMoms app).

Methods: We recruited healthcare staff (midwives, medical doctors, and a dietician) within maternity healthcare in Linköping, Sweden. Twelve semi-structured interviews were conducted (June-November 2020) and were then analysed using thematic analysis.

Preliminary Results: Healthcare staff expressed difficulties communicating healthy habits to migrant women due to language barriers and time constraints. An Arabic and Somali version of the HealthyMoms app was perceived to potentially overcome these barriers and aid in their work as a supportive tool for healthy habits in these women. The app was also highlighted as a tool with great potential to support women with gestational diabetes. The app should have a large focus on physical activity, include information about how the Swedish maternity care works and finally be culturally adapted (e.g., include information about fasting during pregnancy and culturally adjusted recipes). Regarding the app design, the information needs to be easy to understand and the app should include visual content (i.e., pictures, videos, and audio-files) to make it accessible to all women irrespective of literacy level.

Conclusions: Maternity healthcare staff experience difficulties reaching and promoting healthy habits in pregnant migrant women due to communication problems. By translating the app to Arabic and Somali, including visual content and culturally adapting it, the HealthyMoms app could aid healthcare workers in their work to support healthy habits during pregnancy in migrant women.

Dare 2Share

Dr. Vincent van Hees, Senior Researcher, Amsterdam University Medical Center

From engineer to policy maker: How can we work better together?

Effective use of sensor methods to assess physical behaviour (e.g., physical activity, sedentary behaviour) requires collaboration between professionals with different expertise and they may not always understand each other. In this sessions we will distinguish four roles:

- (1) method developers who propose new algorithms, devices, or software;
- (2) method evaluators who evaluate and compare these methods to advise role 3;
- (3) the physical behaviour researchers who use the methods, and finally;
- (4) a broad category of professionals involved in making and implementing public health policies based on the insights gained by the researchers in role 3. An individual can act in multiple roles.

In this session, we will try to facilitate a discussion to find out how we may work better together despite our sometimes very different areas of expertise, with the shared goal of effective using device-based measures.

We will do this via both audience participation and a panel with extensive experience in the respective roles: Ulf Ekelund, Sarah Kozey Keadle, and Vincent van Hees. Fourth panel member from policy maker role tbc. If you want to volunteer for this, contact: v.t.vanhees@amsterdamumc.nl

Format: After a short introduction, the session will be structured in 8-minute discussion blocks.

Each block starts with a short pitch from one of the panel members to explain a particular challenge they perceive from within their role. For example, a developer may see it as a problem that their method is not always correctly used or interpreted, the evaluator may see it as a problem that their advice is not always followed up, the researcher that uses the method may see it as a problem that feasibility of methods receives too little attention, and those involved in making and implementing public health policies may feel that research output is not always tangible for use in the real world. Next, we will use the multimeter.com app to let the audience propose solutions. The panel members discuss these proposed solutions as they come in.

**O2.14 - Addressing physical activity in children,
June 9, 2021**

Physical activity levels, mental health and wellbeing in children and young people in Wales during COVID-19

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Special Interest Group: G. Children and families (SIG)

Purpose: The Coronavirus disease-2019 (COVID-19) pandemic has caused unprecedented disruption to the lifestyles of children and young people. Lockdown rules and school closures have resulted in the withdrawal of the primary source of structure and physical activity (PA) for many children and young people. The aim of this longitudinal observational study is to determine the immediate and long-term impacts of COVID-19 and its associated government-enforced restrictions on PA levels and mental health and wellbeing of children and young people in Wales. The specific objective of this first wave of data collection is to determine the PA levels and mental health and wellbeing of children and young people in Wales during lockdown.

Methods: 1,704 children and young people (8 – 17 year olds; 858 girls) completed a tailored PA, mental health and wellbeing online survey, with a sub-sample of 800 participants, stratified by age and socio-economic status, also wearing an Axivity AX3 accelerometer on their non-dominant wrist for seven consecutive days. The survey included three validated questionnaires: the Stirling Children's Wellbeing Scale (SCWBS) questionnaire, the Good Childhood Index (GCI), and the Physical Activity Questionnaire for Older Children (aged 8 – 11 years; PAQ-C) or the Physical Activity Questionnaire for Adolescents (aged 12+ years; PAQ-A) dependent on age. Furthermore, non-validated, open-ended lockdown-specific questions were asked to capture participants' feelings about being in lockdown. Raw accelerometer data will be analysed in R using the GGIR package to report the full 24-hour activity behaviour profile, including conventional and novel accelerometer metrics. Multivariable linear regression analysis will be used to investigate associations between PA and mental wellbeing. Qualitative data will be analysed using reflexive thematic analysis.

Results: Data have not been fully analysed, but preliminary descriptive analysis of survey data shows low levels of PA, with an average 20% of primary- and 26% of secondary-school children reporting to have done no PA on each of the previous seven days.

Conclusions: The intent is to gain further insight into the effect of the pandemic on children, subsequently informing future strategies needed to improve the lives of children and young people across Wales following this global crisis.

Revisiting the prospective association of physical activity with body composition and physical fitness in preschoolers: a compositional data approach

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Special Interest Group: G. Children and families (SIG)

Purpose: Although physical activity (PA) is generally believed to exert health benefit, there is a lack of data examining the longitudinal associations of PA with later body composition and physical fitness in preschool aged children. In one of the few previous studies, we found positive longitudinal associations of vigorous PA with fat-free mass index (FFMI) and physical fitness using isotemporal analysis. However, concerns have arisen whether issues with multicollinearity may bias isotemporal analysis. This study therefore aims to investigate the prospective associations of sedentary behavior (SB) and PA (at 4.5 years) with body composition and physical fitness at a 12-month follow-up (5.5 years) by re-analyzing the MINISTOP data using a compositional data approach.

Methods: Data from the 138 preschoolers randomized to the control group in the MINISTOP trial were analyzed. Baseline PA and SB data were collected with wrist-worn ActiGraph GT3X+ during seven days (24hr recordings) at 4.5 years of age. Body composition (i.e., fat-free mass [FFM], and fat mass [FM]) was assessed at the 12-month follow-up using air-displacement plethysmography and physical fitness components (i.e., cardiorespiratory, muscular, and motor fitness) within the PREFIT test battery. Isometric log-ratios of the SB and PA variables were introduced in linear regression models.

Results/findings: Increasing vigorous PA at expenses of lower intensity behaviors at 4.5 years old was statistically significantly associated with body composition and physical fitness at 5.5 years old. For example, reallocating 15 min/day from SB, light and moderate PA to vigorous PA was associated FFMI (+0.45, CI: 0.18-0.72 kg/m²), upper-body (+0.6, CI: 0.1-1.19 kg) and lower-body strength (+8 cm, CI: 3-13 cm) as well as greater motor fitness (-0.4, CI: -0.82-[-0.01] s). Pairwise reallocations of time indicated that the behavior replaced did not matter, as long as vigorous PA was increased. Associations were very comparable if moderate-to-vigorous PA was increased at the expense of SB and light PA (all P's<0.04).

Conclusions: More time spent in vigorous and moderate-to-vigorous PA may imply long-term benefits on body composition and physical fitness in preschoolers. Our findings using compositional data analysis corroborate our previously published results using isotemporal analysis.

Physical activity, sedentary behaviour and sleep profiles and their transition in children aged 5.5 and 8 years – findings from a prospective cohort study

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Special Interest Group: G. Children and families (SIG)

Background: Across the 24-h day time spent in movement behaviours (MB), including physical activity (PA), sedentary behaviour (SB) and sleep may have distinct health consequences. However, no previous studies have examined combinations of time spent by children in all domains of MBs using a 24h time-use approach. Among Asian children, we aimed to identify 24h-MB profiles based on night-time sleep, SB, light PA, moderate PA (MPA), and vigorous PA (VPA) and to describe how profiles changed from age 5.5 to 8 years.

Methods: Children in the Growing Up in Singapore Towards healthy Outcomes (GUSTO) cohort were asked to wear an accelerometer on their wrist for seven consecutive days at ages 5.5 and 8 years to measure 24h-MB patterns. This analysis included children with valid data for at least two weekdays and one weekend day at both time-points (n=442). We used latent profile analyses to identify 24h-MB profiles, which were given animal names to convey key characteristics. Latent transition analyses were used to describe the profile membership transition from ages 5.5 to 8 years.

Results: We identified four profiles, “Rabbits” (very high-MPA/VPA, low-SB and average-night-sleep), “Chimpanzees” (high-MPA, low-SB and average-night-sleep), “Pandas” (low-PA, high-SB and longer-night-sleep) and “Owls” (low-PA, high-SB and short-night-sleep), across the time-points. At ages 5.5 and 8 years, the majority of children were classified into profiles of “Chimpanzees” (51% and 39%, respectively) and “Pandas” (24% and 37%, respectively). Most children in the “Rabbits” (100%) and the “Chimpanzees” (>90%) profile met PA recommendations, but few children met sleep

recommendations across all four profiles at both time-points ($\leq 25.3\%$). About half (50.7%) of the children changed their profiles from ages 5.5 to 8 years: the predominant transitions occurred from “Chimpanzees” (27%) and “Owls” (56%) profiles to “Pandas”.

Conclusions: We identified four distinct 24h-MB profiles among children. About half the children changed their profiles from ages 5.5 to 8 years; the predominant transition being towards lower PA, higher SB and longer sleep duration. These findings shed light on distinct patterns of 24h-MB in children, which can aid development and implementation of public health strategies to promote better health.

The mediating effect of physical fitness on long term influences of overweight in primary school girls' academic performance

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Special Interest Group: G. Children and families (SIG)

Purpose: The study determined if longitudinal relationships exists between overweight and academic performance of girls in their primary school years in the North West Province of South Africa, and if physical fitness can affect this relationship. It was hypothesized that overweight will exert a negative impact on academic achievement while physical fitness can bring about a mediation effect on this relationship. The novelty of the study lies in the longitudinal analysis of the effects of various contributors in this relationships over 7 school years.

Methods: Primary school girls (N=172), aged 6-13 years-old partake in this random stratified longitudinal research design including three follow-up measurements over seven years. Body Mass Index was used to compile obesity profiles, while the progressive aerobic cardiovascular endurance run (PACER) was used to determine cardiovascular fitness. Academic school achievements for grades 1, grade 4 and grade 7, as well as national and provincial values were correlated with academic performance. Data were analysed by a repeated measure over time ANOVA as well using a latent growth curve model from the structural equation modelling framework (SEM).

Results/findings: No differences ($p>0.05$) were found in the academic performance of obese and normal weight girls, although obese girls showed poorer physical fitness values ($p<0.05$). The SEM model was a good fit for all requirements (RMSEA, 0.60; CMIN DF, 2.837; CFI, 0.966). VO2max had a standardized indirect mediation effect (-132) while body composition showed a standardized direct effect (0.183) with academic achievement. Physical fitness showed a mediation effect regarding obesity and academic achievement in grade 7 girls.

Conclusions: Overweight contribute to multiple health risks in children, while also impacting negatively on educational performance Physical fitness can impact outcomes beyond health related measures. It can play a mediating role in combating the negative effects of being overweight, showing reversible effects on relationships between obesity and academic achievement. Physical fitness should be used strategically as preventive measures to enhance cognitive functioning, academic performance and brain health among overweight children.

Evaluation of the dissemination of the South African 24-hour movement guidelines for birth to 5 years

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Special Interest Group: G. Children and families (SIG)

Purpose: South Africa launched 24-hour movement guidelines for birth to five years in 2018, and was the first low- and middle-income country (LMIC) to develop such guidelines. The guideline dissemination plan adopted a ‘train-the-trainer’ through workshops with community-based organisations (CBOs) working in early childhood development (ECD). The purpose of this study was to: 1) document this dissemination process; and 2) report on the feasibility of implementing the dissemination workshops, the acceptability of the workshops (and guidelines) for different end user groups, and the extent to which CBO representatives disseminated the guidelines to end-users.

Methods: A database of ECD CBOs was compiled, and based on responses, fifteen dissemination workshops were held in seven of South Africa’s nine provinces with a total of 323 attendees. A short evaluation questionnaire was used (n=281), and group discussions took place to obtain participants’ feedback. Additionally, a song about the guidelines was developed – ‘Woza, Mntwana’, as a creative dissemination resource. Six follow-up focus groups (n=28) were conducted to evaluate the extent to which workshop attendees disseminated the guidelines to their CBO staff and end-users, and to obtain feedback on the campaign song. Descriptive statistics were generated for questionnaire data, and qualitative data were analysed using a thematic approach.

Results: The majority of participants were positive about the workshops: 96% agreed/strongly agreed that the workshop helped them to understand 24-hour movement behaviour, why these behaviours are important for young children, and how to share the guidelines. Questionnaire and qualitative findings also indicated that these workshops were feasible for community-based dissemination of the guidelines, and that this method of dissemination was acceptable to CBOs and end-users. Findings from follow-up focus groups indicate that the guidelines were shared with end-users, although challenges were identified. An additional guideline resource, the ‘Woza, Mntwana’ song, was well-received by participants, and sharing via WhatsApp was believed to be the most effective way to disseminate this song.

Conclusions: These findings affirm the need for community-based dissemination of behavioural guidelines, particularly in low-income settings. These findings are relevant for other LMICs and high-income countries where low-income communities would benefit from a community-based approach.

Increasing co-physical activity in parent-children dyads: Results of a family-based physical activity intervention

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Special Interest Group: G. Children and families (SIG)

Purpose: Physical activity (PA) has a myriad of benefits including better physical and mental health. Encouraging parents to take part in PA with children may have additional benefits such as improved parent-child relationships. In this study, we designed and evaluated the effectiveness of a family-based intervention aimed to increase co-PA in parent-child dyads.

Methods: A randomized controlled design was used to evaluate the Active 1+FUN intervention. Parents and children (mean age = 10.0; 40% were girls) from 171 families were included in the trial. Co-PA between parents and children were measured using the proximity function of the ActiGraph wGT3X-BT accelerometers. Randomization (by family) took place after the outcomes were measured at baseline (T1). Families allocated to the experimental group then received a 10-session intervention that consisted of a knowledge-base workshop (30 minutes) followed by a coach-led activity session (60 minutes). Co-PA was measured at the end of the intervention period (T2) and 12 months from baseline (T3). Hierarchical linear modeling was used to examine changes in co-PA from T1 to T2 and T1 to T3, respectively.

Results/findings: Overall daily co-PA of participants were low (7.3, 7.4, and 4.7 minutes per day at T1, T2, and T3, respectively). The Time*Group interaction from T1 to T2 ($B=0.99$, $p=.65$), or T1 to T3 ($B=-1.27$, $p=.15$) were not significant. However, our results also suggested that families in the experimental group spent more time in co-PA in both T1 ($B=2.76$, $p=.046$) and T2 ($B=3.74$, $p=.02$).

Conclusions: The hypothesized intervention effect was not found in this study, which may be attributed to differences in co-PA levels at baseline. However, family-based activities should be promoted since it may enhance the activity levels of both generations. Despite the lack of findings, we demonstrated that Bluetooth-enabled accelerometry is a viable objective measure for co-PA. Future research may continue to employ this method to examine family-based activities.

**O2.15 - Habits, past-behavior and innovative interventions for behavior change,
June 9, 2021**

Co-creating maps of determinants of food choices with adolescents: a qualitative study

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Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: Adolescents' diet is frequently suboptimal which has a triple impact on their immediate health, future health, and the health of the next generation. Interventions that focus on adolescents' values have shown a positive impact on motivation for health behaviour change. However, very few studies have explored underlying motivations of adolescents' food choices. This study aimed to explore what factors motivate adolescents' food choices, what is the perceived impact of each factor in relation to the others, and how these factors relate to each other.

Methods: Adolescents age 12 to 17 years old participated in 26 semi-structured individual qualitative interviews to understand their motivation for food choices. During the individual interviews, a rudimentary conceptual map was created with each participant. The individual maps were then combined into age group specific maps (12-13, 14-15 and 16-17 years-old). Focus groups were then conducted to explore relevance of the different factors and connections between them. Data analysis is ongoing using grounded theory and the maps will be supplemented with data from individual interviews.

Results/findings: Preliminary analysis show that parents (what they eat and cook), friends (what they eat), convenience (quick, easy, nearby and time it takes to prepare) and what they like/want were key factors that influence food choices. During individual interviews, environmental concerns (climate change and global warming) and social media (influencers and their diets/bodies) were frequently mentioned but were discussed to a lesser extent in the group interviews. Adolescents associated cravings with both their likes/wants and the convenience of what they are craving.

Conclusions: The use of conceptual maps allows to increase young people to voice their own experience of choosing food for themselves. Finding the influences of adolescent's food choices and how they relate to each other has the potential to design more engaging and effective interventions to improve diet in adolescents.

The relationship between past behavior, social cognitive constructs, and sports participation in transitioning university students

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Special Interest Group: **B. Motivation and behavior change (SIG)**

Purpose: Sport can provide many health benefits to university students, yet participation rates in transitioning students tend to decline. The Theory of Planned Behavior (TPB; Ajzen, 1991) has been successfully adopted to understand participation in many health behaviors, such as sport. Despite its utility, the inclusion of past behavior has been shown to have significant effects on social cognitive constructs and future behavior. Such effects have been suggested to represent automatic, habitual processes. The purpose of the study was to understand the relationship between social cognition constructs and past behavior relating to sports participation in transitioning university students.

Methods: A prospective correlation design was used with two waves of data collection. First-year undergraduate students (N = 286) completed assessments of TPB constructs and past behavior at Time 1. Four-weeks later at Time 2 participants reported their participation in sport. Two structural equation models were conducted; Model 1 tested the influence of TPB constructs on behavior and Model 2 included past behavior.

Results: Model 1 accounted for 59% of the variance in intention and 42% in behavior, which increased to 68% and 43%, respectively, in Model 2. Model 1 demonstrated all three antecedents of intention to be significant and intention to predict behavior. Intention also mediated the effects of attitude, subjective norm, and perceived behavioral control on behavior. Model 2 showed similar direct and indirect effects. Moreover, past behavior had a total effect on behavior and a direct effect on all TPB constructs. The effects of past behavior on intention and behavior were mediated by TPB constructs and there was no direct effect from past behavior to behavior.

Conclusions: The study found the TPB to explain transitioning university students' participation in sport. The study also showed the effects of past behavior to be mediated through social cognition constructs. Study findings suggest interventions should focus on the conscious, deliberative factors underlying sports participation rather than habitual, automatic factors. This could be due to the unstable environments transitioning students navigate when starting university.

Exercise Apps. A pilot study on how the use of big data for multivariable analysis can be applied in order to predict user behaviour and promote engagement

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Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: According to the WHO, increasing physical activity levels should be a priority, worldwide. Many applications (Apps) in the market offer asynchronous training plans which could potentially help lead more active lifestyles. However, attrition rates to training apps tend to be high and behavioural change remains a challenge. The goal of this project is to design a computerized predictive model to help identify App user behaviour, before it occurs. Eventually, motivation actions will be undertaken to promote adherence to healthy patterns.

Methods: This was an observational, retrospective pilot study to assess adherence and usage patterns of Mammoth Hunters, an App that personalizes exercise plans with the aim of breaking the barriers of lack of time, knowledge or motivation to increase activity. Data on demography and App usage were collected (n= 777). Correlations between the available data were extracted by using three clustering models: K-means, Balanced Iterative Reducing and Clustering Using Hierarchies (BIRCH) and Agglomerative Clustering. The clusters were validated using the Silhouette score and Calinski-Harabasz Index.

Results: With demographic details and usage data we extracted the patterns and factors related to adherence in App users. Findings were consistent across all of the applied clustering models. Three similar clusters based on user BMI and the mean workout frequency per month were identified, with a silhouette score and Calinski-Harabasz Index of 0.27 and 264 respectively for K-means clustering, 0.24 and 210 respectively for BIRCH clustering, and 0.23 and 212 respectively for the Agglomerative clustering. Additionally, a motivational questionnaire was validated in a subsample of 222 users.

Conclusions: Mammoth Hunters App users have been clustered according to their demographic details and usage habits. We will next study the correlations between their motivation (intrinsic vs extrinsic) and their levels of engagement to their exercise plan, by using artificial intelligence and machine learning. This will enable us to identify user patterns and predict their behaviour. By doing so, we plan to develop a series of motivational interventions to promote user adherence to exercise and reduce App attrition.

Preventing long-term weight regain in European adults involved in the NoHoW trial: a signal detection analysis of self-regulatory/motivational predictors

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Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: Preventing weight regain after weight loss is a major challenge that could partly be addressed by identifying predictors of long-term weight management. This study aimed to examine, in a hierarchical fashion, self-regulatory and motivational predictors of 12- and 18-month successful weight loss maintenance (WLM) in adults who achieved clinically significant ($\geq 5\%$) weight loss.

Methods: Data reported here is from the NoHoW 2x2 factorial randomized controlled trial, which tested the efficacy of a theory-based digital toolkit for WLM. A total of 1263 and 1180 participants (68.4% women; 45 ± 11.7 y; 29.4 ± 5.0 kg/m² at study entry) completed the 12-month and 18-month assessments, respectively. Signal detection analysis identified self-regulatory/motivational variables that best predicted $< 3\%$ weight change (weight loss plus weight maintenance) vs. $\geq 3\%$ weight change (weight regain), from baseline to 12-month and 18-month measurement. A set of 25 self-regulatory/motivational predictor variables (6-month changes from baseline) plus study arm and compliance, were examined. To compare the self-regulatory/motivational profile of the most and least successful subgroups emerging from signal detection analysis, independent-sample t tests, corrected for multiple testing using the Bonferroni's procedure, were used.

Results/findings: Participants with higher changes in self-monitoring, self-efficacy for WLM and competence need satisfaction were more likely to achieve success at 12 months (83.3%; $p < 0.001$). Higher changes in integrated regulation for eating behaviors proved somewhat compensatory for individuals with lower changes in self-efficacy for WLM (70.6% vs. 53.4% for individuals with lower changes in integrated regulation; $p < 0.01$). Similarly, individuals with higher changes in self-monitoring and competence need satisfaction and lower changes in amotivation for healthy eating behaviors were significantly more likely to achieve $< 3\%$ weight change at 18 months (74.7%; $p < 0.01$). Participants with lower changes in self-monitoring skills, higher changes in introjected regulation and lower changes in integrated regulation for eating behaviors were the least successful at 18 months (only 30% achieved success). The most successful subgroups at

both 12 and 18 months showed a significantly more positive profile concerning the majority of self-regulatory/motivational predictor variables.

Conclusions: Improving self-monitoring skills, self-efficacy for WLM and promoting competence need satisfaction are promising and priority intervention targets in order to promote clinically significant WLM.

How to break habits? How 'dormant habits' may undermine weight loss maintenance

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Special Interest Group: B. Motivation and behavior change (SIG)

Purpose. Recent definitions propose a distinction between 'habit' – a psychological process whereby exposure to cues triggers learned cue-behaviour associations, which in turn activate a non-conscious impulse to act – and 'habitual behaviour', which denotes action brought about by the habit process. This distinction has important implications for weight loss maintenance, as it allows for the possibility that people may successfully discontinue unwanted habitual behaviour – by, for example, avoiding cues, or wilfully inhibiting unwanted habit impulses – yet retain the underlying habit associations that generate such impulses. In such instances, these 'dormant habits' – i.e. learned, automatic habit associations that have not been acted upon for some time due to avoidance of cues or wilful inhibition – may later re-emerge, derailing behaviour change attempts. People trying to maintain weight loss may thus relapse into old patterns of behaviour upon exposure to certain cues, or when their willpower is depleted. This paper argues that dormant habits pose a risk to weight loss maintenance but have been overlooked as intervention targets.

Methods: Two literature reviews were undertaken, by locating existing reviews and coding eligible studies from those reviews. Review 1 identified qualitative studies of post-intervention experiences of weight loss maintenance, which were subsequently coded for key indicators of the ongoing influence of dormant habits among study participants. Review 2 described the behaviour change content of weight loss interventions, and specifically, the presence or absence of six techniques conducive to breaking habit associations (e.g. habit reversal, behavioural substitution).

Results/findings: In Review 1, 18 (69%) of 26 studies reported some evidence of participants experiencing unwanted, environmentally-dependent and automatic tendencies to engage in behaviours antithetical to weight loss, suggesting that many were struggling to overcome dormant habits. In Review 2, only five (4%) of 130 interventions used techniques suited to breaking dormant habit associations.

Conclusions: Interventions largely fail to acknowledge that people trying to maintain weight loss may experience the continued influence of unwanted dormant habits. Intervention developers should adopt strategies that not only inhibit engagement in unwanted habitual behaviours, but also break underlying cue-response associations that may undermine weight loss maintenance.

A theory-based multicomponent intervention to reduce occupational sedentary behaviour in professional male workers: a cluster randomised crossover pilot feasibility study

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Special Interest Group: B. Motivation and behavior change (SIG)

Strong evidence demonstrates that more time spent in sedentary behaviour (SB) is related to greater all-cause mortality, cardiovascular disease mortality, type-2 diabetes, and cancer. Current evidence supports the use of multi-level interventions developed using participative approaches targeted at specific at-risk subgroups. This study aimed to establish the acceptability and feasibility of a multicomponent theory-led intervention incorporating behaviour change techniques to reduce workplace sedentary behaviour and increase physical activity.

Methods
A pilot feasibility study using a cluster randomised-controlled crossover design was used. The intervention targeted factors at the individual (mHealth using a Garmin watch), the environment (provision of an under-desk pedal machine), and the organisational levels (management recruitment to the study), that influence occupational SB. The primary outcomes of the study were acceptability and feasibility of assessments, study procedures and processes from an employee and management perspective (focus groups, semi-structured interview); recruitment and retention; and a qualitative evaluation of participants' perspectives of the intervention overall. Secondary outcomes included SB and PA (objective (ActivPAL) and subjective (EMA)), and work engagement (UWES-9). Results

The results showed that the intervention, as well as the trial processes were acceptable and feasible to conduct (n=21). The main intervention benefit was an increase of awareness of the dangers of SB through participation in the study, at both management and staff level, as well as increased productivity from a management perspective. The main intervention barriers were time priorities and the lack of assistance with the ergonomic set up of the pedal machine. Recruitment rate was 40% at cluster level, and 80% at an individual level; retention was 95% overall from baseline to post-intervention (8-weeks). Mean cycling time was 27 minutes/day (SD 10.23) in the intervention period. Workplace SB reduced by 20.4 minutes/day, and total weekday SB reduced by 45.7 minutes/day.

Conclusion
This study demonstrated the acceptability of a multicomponent intervention to reduce workplace SB in professional men. The implications of such an intervention on SB and PA requires further research, but the present evidence suggests that it is possible to reduce workplace SB using an under-desk pedal machine and mHealth by increasing cycling time.

**O2.16 - Interactions with the food environment,
June 9, 2021**

Addressing and communicating synergies and trade-offs between human health and environmental sustainability in food-based dietary guidelines: A scoping review

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Special Interest Group: H. Policies and environments (SIG)

Purpose: We reviewed, analysed and compared methods for integrating sustainability in food-based dietary guidelines (FBDG) worldwide, aiming to support a more widespread systematic and methodologically sound consideration of sustainability in future FBDGs. Special attention was paid on how synergies and trade-offs between human health and environmental sustainability were addressed in FBDGs and communicated towards guideline users.

Methods: We included official FBDGs provided in the online repository by the Food and Agriculture Organization (FAO). Only material in English or German that was readily available over the FAO website was included. We searched for aspects of environmental sustainability in FBDGs with pre-defined keywords. We identified keywords through a full analysis of 12% of all FBDGs and an analysis of FBDGs of which we already knew they had sustainability incorporated due to previous reviews. Identified sections were analyzed using the software tool MAXQDA.

Results: Of 94 FBDGs in the FAO repository, 32 were available fully or in part in English or German in a machine-readable format and were included in our analysis. Of these, 24 incorporated aspects of environmental sustainability. Most operationalized were interdependencies and synergies between human health and environmental sustainability (11 countries). According to these guidelines, synergies may emerge from consuming less meat (four countries), and by shifting towards more plant-based foods (nine countries), as well as an energy balanced diet (five countries). More controversially, some guidelines also posited that synergies may accrue from decreasing animal foods in general (five countries), as well as sugar (two countries) and processed foods (five countries). Sustainability also was addressed within several food groups. Aspects were incorporated into guidelines as part of the introduction, in form of single statements, as a recurring theme, or within a specific chapter on sustainability.

Conclusions: Of 32 analysed countries, 75% (n=24) have incorporated sustainability in their FBDGs. One initial step for future FBDGs could be a stronger emphasis on synergies between health and sustainability.

Factors influencing women's food choices and the support they require to make healthier food selections in supermarkets – a qualitative study

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Special Interest Group: H. Policies and environments (SIG)

Purpose: Supermarkets are a major source of food for families, and women remain primarily responsible for food shopping. The factors women perceive to influence their food shopping choices are poorly understood. This study examined women's perceptions of these factors, particularly in relation to store layout, and the ways that supermarkets could support healthier choices.

Methods: In this qualitative cross-sectional study, semi-structured telephone interviews were conducted with 20 women customers aged 18-45 years, recruited from six supermarkets across England. Participants were asked to describe factors in-store that prompted their food selections. The actions supermarkets, governments and customers can take to support healthier food shopping choices were explored. Thematic analysis was conducted using QSR NVIVO software 11. Four researchers were involved in developing the initial coding framework, double-coding six interview transcripts and refining the coding framework.

Results: Participants had a median age of 39.5 years (IQR: 35.1, 42.3), median weekly grocery spend of £70 (IQR: 50, 88), and 44% had left school aged 16 years. Six key themes were identified: 1) Physical Environment, 2) Value for Money, 3) Influence of Family, 4) Physiological/Psychological State, 5) Level of Awareness of Food Decisions and 6) Responsibility for healthy eating. Women reported that achieving value for money, feeling hungry, tired, or stressed, and meeting family members' food preferences influenced their food shopping choices. Many participants described how they made unintended food selections as a result of prominent placement of unhealthy products, even if they adopted more conscious approaches to food shopping (i.e., written or mental lists). Participants described healthy eating as a personal responsibility but some stated that governments and supermarkets could be more supportive to help customers make healthier food shopping choices.

Conclusions: This study highlighted how the in-store environment can prompt unhealthy food choices. The responsibility for healthy food choices is seen to belong to individuals but the supermarket environment is not designed to facilitate this. Creating healthier supermarket environments could reduce the burden of personal responsibility for healthy eating, by making healthier choices easier. Future research could explore the interplay of personal, societal and commercial responsibility for food choices and health status.

Women's reactions to the COVID-19 food system shock and insights for strategies supporting healthy purchasing and dietary behaviours: a qualitative study

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Purpose: The COVID-19 pandemic disrupted usual routines, including families' food acquisition and consumption patterns. This pandemic could have lasting effects on consumer behaviour and implications on future strategies to improve population diet. The aim of this study was to gain in-depth understanding of families lived experiences by i) examining the impact of the COVID-19 pandemic disruption on the food purchasing and eating behaviours of young women, and ii) identifying the insights these experiences bring to designing future healthy eating interventions.

Methods: A cross-sectional sample of 34 customers of a UK discount supermarket chain completed semi-structured telephone interviews. Women were asked questions to understand their lived experiences of food shopping, cooking and eating during the COVID-19 pandemic lockdown. Interviews were transcribed verbatim and analysed thematically.

Results: Participants' median age was 35 years and 56% were in paid employment. Findings show that participants overwhelmingly displayed emotional responses to COVID-19 pandemic disruptions of their food purchasing and dietary behaviours. Anxiety was common, with many feeling anxious about not acquiring enough or preferred foods for their families; contracting COVID-19 while food shopping; or needing to balance food costs, meal/snack variety and health. Frustration was also widespread, particularly about those who stockpiled; the poor availability of products which caused challenging situations at family mealtimes; shoppers who did not respect social distancing rules; and queues/one-way systems that made food shopping longer or less successful. These negative emotions were balanced against feelings of empathy, altruism and pleasure. Many participants were understanding of government and supermarket restrictions, or took the risk of shopping in-store to leave delivery slots for vulnerable customers or to help neighbours. Several women enjoyed leaving the house/family to go food shopping but missed being able to browse for meal ideas; others liked having more family meals and time to cook healthier dishes together.

Conclusions: Strategies to improve food purchasing and diet may be enhanced if positive emotions, like pleasure in families cooking and eating together, are targeted. As communicating the necessity for COVID-19 rules increased public acceptance, a similar approach could be adopted for policies to improve supermarket environments that may disrupt shoppers' routines.

Where do Dutch adults obtain their snack foods? Exploring individuals' interactions with the food environment

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Purpose: Little is known around the geographic context in which unhealthy snacking behaviours occur. To investigate i) how often Dutch adults consume unhealthy snacks, ii) at what types of locations they obtain these snacks, and iii) whether there are sociodemographic differences in the frequency and location of snack food consumption.

Methods: Cross-sectional survey with 1784 Dutch adults. Participants reported the frequency of consumption of 10 snack foods (e.g. cookies, fried snacks) and the type of location they obtained them (e.g. supermarkets, snack bars) along with age, sex, number of children in the household, income, education and occupation. Logistic regression analyses identified sociodemographic differences in i) high frequency of snack consumption and ii) the top three most used locations.

Findings: Mean age was 43 years (64% women), 40% had children and 45% were highly educated. Sweets, chocolate, cookies, crisps/salty snacks, and nuts were consumed most frequently (at least weekly), followed by pizza and fried snacks (at least monthly). Pies/cake, ice cream and sausage rolls were consumed yearly. The three most often reported locations for obtaining snacks were "supermarket during regular shopping", "supermarket during unplanned visit" and "at family/friends' homes". Less often reported were train stations, sports clubs, workplaces, bakeries, snack bars, gas stations, specialty stores and bars/restaurants. There were notable sociodemographic differences in the frequency and location of snack food consumption. Compared to males, females were less likely to report high consumption of pizza (OR:0.51, 95%CI:0.35;0.73), fried snacks (OR:0.62, 95%CI:0.48;0.80) and sausage rolls (OR:0.26, 95%CI:0.16;0.42), but more likely to report high consumption of chocolate (OR:1.36, 95%CI:1.10;1.68). Regular supermarket visits were especially important locations for purchasing snacks for households with children, who were consistently more likely to purchase all types of snacks from the supermarket than households without children; e.g., OR for purchasing sweets from the supermarket=1.58 (95%CI:1.28;1.96), OR for purchasing chocolate from the supermarket=1.43 (95%CI:1.13;1.79).

Conclusions: People with different sociodemographic characteristics use the food environment in different ways. However, the supermarket was consistently used by all subgroups to obtain all types of snacks, whether on a regular grocery shopping, an unplanned shop, or by family and friends.

Exploring whether the use of food retailers explains the association between distance to food retailers and snacks consumption

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Purpose: Research on the relation between the food environment and dietary behaviours is inconsistent. This inconsistency may be due to a discrepancy between assumed exposure (e.g., measured proximity or density of food retailers) and actual exposure (use of food retailers). We aimed to investigate the mediating role of use of fast-food outlets, regular, and discount supermarkets in the association between distance from home to food retailers and snack consumption.

Methods: Cross-sectional survey among Dutch adults (mean age 42.5y, 64% women). Total snack consumption was calculated by summing the frequency of consumption of 10 snack foods (e.g. chocolate, cookies, fried snacks). Participants reported on whether or not they used selected food retailers within 10-minutes walking from home. Objectively measured distances to each food retailer were calculated within 800 metres (equalling a 10-minute walk) around the home. Complete case (N=1589), multiple regression analyses with bootstrapped confidence intervals were used to estimate the mediating role of use of food retailers.

Findings: Distances from home to either fast-food outlets, discount and regular supermarkets were not associated to snack consumption. We observed no significant mediating effect of use of food retailers in the analysed associations. Nonetheless, we found that to every 100 metres further away from the respective food retailer, participants had 8% lower odds of using a fast-food outlet (odds ratio(OR)=0.92, 95% confidence interval(CI)=0.87;0.97); 14% lower odds of using a regular supermarket (OR=0.86, 95%CI=0.81;0.90) and 11% lower odds of using a discount supermarket (OR=0.89, 95%CI=0.87;0.90). The use of fast-food outlets (β =4.09, 95%CI=2.71;5.48) and regular supermarkets (β =1.88, 95%CI=0.24;3.52), were, in turn, associated with higher snack consumption.

Conclusions: Distances to fast-food outlets, regular and discount supermarkets were not associated with snack consumption, neither considering the total effect or via the use of food retailers. However, we found that distance was a predictor of use of food retailers, and that the use of fast-food outlets and regular supermarkets was associated with higher snack consumption.

Favourable commercial and health behavior impacts of a healthy vending policy at an Australian university

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Purpose: As health educators and leaders, universities can and should demonstrate good health promotion practice to the wider community. Previous research shows that healthy food retail interventions also need to consider commercial sustainability and should take a holistic approach to consumer experience. However, there are very few long-term evaluations of multi-component university healthy food retail interventions. The aim of this study was to determine the health behavior and commercial outcomes of a healthy vending policy implemented as one part of a holistic university food policy.

Methods: A quasi-experimental design evaluated a multi-component policy implemented across four university campuses in Victoria, Australia in April 2018. Beverages were classified based on their nutritional content using a voluntary state government traffic light framework as 'red' ('limit'), 'amber' ('choose carefully'), or 'green' ('best choices'). Policies included (i) display $\leq 20\%$ 'red' beverages and $\geq 50\%$ 'green' beverages; (ii) machine traffic light labelling; (iii) health-promoting machine branding; (iv) review of machine placement; and (v) recycled bottle packaging. Monthly electronic sales data were collected from 51 beverage vending machines from January 2016 (27 months pre-policy) to December 2019 (21 months post-policy). Interrupted time series analysis of sales data compared 'red', 'amber', and 'green' beverage volume sales, and revenue post-policy to predicted sales.

Results: By the 21st month post-policy implementation, there was a 112.5% [95%CI: 23.5, +201.6] increase in total beverage volume sold and a 100.4% [+33.1, +167.6] increase in revenue. There was no change in 'red' beverage volume sold, but increases in 'green' (+119.7% [+33.9, +205.5]) and 'amber' (+209.1% [+5.7, +412.5]) volume sold.

Conclusions: This study is the longest follow-up of a beverage vending intervention to date. The sustained health behavior and commercial impacts of this multi-component policy at 21 months suggest that such vending interventions can be effective and sustainable in the medium- to long-term. While it is difficult to say to what extent the holistic approach contributed to the success of this real-world policy, it does provide a promising model to promote healthy food retail in vending and other contexts.

**O2.17 - Digital health for nutrition, physical activity and weight management,
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Women's perspectives on mHealth lifestyle interventions for gestational diabetes management during pregnancy and postpartum diabetes prevention: qualitative systematic synthesis review

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Purpose: Gestational diabetes is a common pregnancy complication with acute peripartum risks as well as heightened chronic disease risk that includes a ten-fold risk for developing type 2 diabetes compared with normoglycaemic pregnancies. Mobile health technology (mHealth) provides a practical solution to supporting women during both pregnancy and postpartum with lifestyle modification. However, the optimal design for this population is unknown. We aimed to systematically review the perspectives of women with GDM or a recent history of GDM on mHealth pregnancy and postpartum lifestyle interventions to inform future intervention development.

Methods: Five electronic databases (PubMed, MEDLINE, EMBASE, CINAHL, PsycINFO and Cochrane Central Register of Controlled Trials) were searched up to April 2020. Study quality was evaluated using Joanna Briggs Institute Critical Appraisal Checklist for Qualitative Research and a reflexive thematic synthesis performed. The COM-B model was used to frame findings for use in future mHealth intervention development.

Results: 14 studies met the inclusion criteria representing the views of 327 women. Three pregnancy themes were identified: support, connectedness, and trust. Pregnant women valued mHealth interventions that sat alongside usual care and provided healthcare professional support, trusted information and self-monitoring. The health of their baby was a major motivator. Two postpartum themes were identified: support and connectedness. Postpartum women valued peer connections and use of rewards to remain motivated. They identified more limitations with mHealth interventions than pregnant women. Seven recommendations for future intervention design were made, mostly with high or moderate confidence.

Conclusions: Women's views on mHealth lifestyle interventions differ between pregnancy and the postpartum period. The use of participatory design is key in the development of mHealth interventions and this review summarises the needs of the users. The results also reflect the impact a GDM diagnosis has on a woman highlighting the need for ongoing support continuing postpartum. Future research should aim to improve the quality of qualitative research reporting to increase confidence in findings

The variability of emotions, physical complaints, intention and self-efficacy towards physical activity: an EMA study in older adults

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Purpose: Many theoretical frameworks have been developed to understand health behaviors such as physical activity. The determinants within these frameworks are usually considered relatively stable over time. However, in reality individual-level determinants vary over time, and also vary within and between individuals. In order to make health behavior change interventions more personalized, information on the time-dependent variations of determinants is urgently needed. To do so, the COM-B framework can be used as a dynamic framework, including reflective (conscious) as well as automatic (unconscious) processes that may vary over time (i.e. within and between days). The aim of this study was to examine the time-dependent variability of emotions, physical complaints, intention and self-efficacy towards physical activity using Ecological Momentary Assessment (EMA).

Methods: Observational data were collected in 67 Belgian older adults, using time-based EMA. EMA is a methodology to repeatedly collect real-time data on subjects' behavior and/or experiences in their natural environments. Participants answered questions regarding emotions, physical complaints, intention and self-efficacy towards physical activity six times a day using a smartphone-based questionnaire (The Smartphone Ecological Momentary Assessment 3 (SEMA3) application). Additionally, participants filled in an intake questionnaire assessing socio-demographics. Generalized linear mixed models were estimated using R version 4.0.1.

Results/findings: Emotions vary within individuals within days (approximately 49% of the total variance), except for enthusiasm which rather varies between individuals (54.4%). Physical complaints vary between individuals (approximately 60%), and less within individuals within days. However, tiredness and dizziness also vary within individuals within days (51.8% and 46.6%). Intention and self-efficacy both vary more within days within individuals (64.5% and 51.1%) than between individuals. More detailed findings will be presented at ISBNPA XChange 2021.

Conclusions: This study shows that emotions, dizziness, tiredness, intention and self-efficacy are strongly time-dependent, and should be treated as 'dynamic' or unstable behavior determinants. This study provides us with important insights concerning the development of more personalized health behavior change interventions, anticipating real-time dynamics of determinants instead of considering determinants as stable within individuals.

Quality over quantity: Increasing need-supportive communication in online communities via a brief intervention video

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Purpose: Social networking sites (SNS) and online communities provide a huge potential for supporting behavior change. However, SNS-based interventions largely vary in their effectiveness and engagement rates. We examine whether a brief Self-Determination-Theory-based communication intervention via an educational video can positively affect behavior change, perceived need-support, and engagement in an SNS-based physical activity and eating behavior intervention.

Methods: We tested the effects of a Self-Determination-Theory-based intervention video (vs. a control video on netiquette rules) on need-supportive communication strategy use to fictive Facebook postings (Experiment 1, N = 76) and perceived need-support, engagement, and behavior change in a forum-based behavior change intervention (Experiment 2, N = 190). In Experiment 2, in addition to a goal-setting intervention, participants joined a peer-based online support forum for two weeks in order to improve their eating or physical activity behavior. Data from both experiments were analyzed with (generalized) mixed models and follow-up tests.

Results/Findings: Experiment 1: Participants from the intervention but not from the control group showed an increase in the number of need-supportive communication strategies (condition*time interaction, partial $\eta^2 = .31$). Between-group differences were consistent and large for competence- and relatedness-supportive strategies (all d s > 0.94) but small and less consistent for autonomy-supportive strategies. Experiment 2: Participants watching the intervention video had a higher engagement (number of logins, number of postings, and subjective forum visit frequency) than participants watching the control video. There were no other effects on our primary and secondary outcomes. The missing effects could be due to low strategy uptake and restricted applicability of the communication strategies to all postings.

Conclusions: A brief Self-Determination-Theory-based video intervention may be suitable to promote need-supportive communication strategy use and could serve as a low-cost intervention to improve need-supportive communication. However, its applicability and effectiveness in ecologically valid contexts need further evaluation. Future studies should incorporate additional strategies for improving communication strategy uptake and engagement in SNS and online communities.

Active use of internet-based lifestyle app is associated with enhanced eating competence in adults at risk for type 2 diabetes

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Purpose: Digital apps potentially provide an easily accessible way to reinforce implementation and scaling up lifestyle counselling to promote a healthy diet and prevent type 2 diabetes (T2D). Eating competence (EC) has been associated with good diet quality and successful weight management, which, in turn, are major protective factors against T2D. However, it is still unclear how EC including positive attitude towards eating, regular meals, internally regulated eating and accepting and eating different foods is affected by the use of digital apps. Therefore, we studied the association between the use of a digital lifestyle intervention app and changes in EC in a subgroup of participants of the Finnish StopDiabetes trial.

Methods: Altogether 1938 Finnish adults (mean age 55 years, 80% women) at increased risk for T2D were randomized to receive either a 'digital' or 'digital + face-to-face group counselling' intervention. The intervention continued for 12 months and was conducted in primary healthcare. Participants got access to the BitHabit app, which included nearly 500 simple behavioral suggestions intended to support habit formation for a healthier lifestyle, including eating behaviors and attitudes. The participants were able to browse, select, and track habits from 13 different lifestyle categories. EC was measured by the Satter Eating Competence Inventory 2.0TM at baseline and at the end of the one-year of intervention. Statistical analyses were performed using linear mixed-effects models with adjustments.

Results: The median (interquartile range) for the habit actions tracked in the app was 391 (53 to 1146) during the one-year intervention. A higher number of actions was associated with an increase in EC ($p < 0.001$) regardless of the intervention arm. The number of actions in all lifestyle categories, except for Non-smoking, were associated with improvements in EC during the intervention (all $p < 0.05$), the most significant categories being Vegetables and fruit, Sugar, Sedentary behavior, and Meal frequency.

Conclusions: The active use of the app, especially for tracking diet-related habits, could enhance EC in adults at increased risk for T2D. The habit formation app with a wide selection of health promoting behaviors seems a promising tool to influence eating behavior and, thus, for the prevention of T2D within primary healthcare services.

The effects of a web-based computer-tailored diet and physical activity intervention based on self-determination theory and motivational interviewing: A randomized controlled trial

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Purpose: This study investigated whether a combined diet and physical activity (PA) web-based computer-tailored intervention, called MyLifestyleCoach, effectively promoted dietary and PA behaviors. This intervention was based on self-determination theory and motivational interviewing.

Methods: A two-arm randomized controlled trial with 1142 Dutch adults was conducted. The intervention and control group completed questionnaires at baseline, 6, and 12 months from baseline. Only the intervention condition had access to MyLifestyleCoach. The waiting list control condition had access to the intervention after completing the 12-month follow-up questionnaire. A modified food frequency questionnaire was used to measure dietary behaviors (fruit, vegetables, fish, and unhealthy snacks). The Dutch Short Questionnaire to ASsess Health was used to measure the weekly minutes of moderate-to-vigorous PA (MVPA). Usage data, which is operationalized as completed sessions in this study, was assessed by log data. Two-step linear mixed effect models were performed. In the first step, a model consisting of condition, time, potentially confounding variables and a random intercept for participants was tested. In the second step, an interaction term was added to investigate the intervention's (time × condition) and usage (time × opening session and time × completed sessions) effects over time for the dietary and PA outcomes.

Findings: The results showed no differences over time between the groups for all four dietary behaviors and the weekly minutes of MVPA. Furthermore, participants who followed the opening session of the intervention, in which they received general feedback on their behaviors, consumed significantly more fruit at 6 months and vegetables at 12 months than participants who did not follow the interventions' opening session, including the participants in the waiting list condition. Lastly, participants who followed more sessions in the diet module consumed more fruit at 6 months and vegetables at 6 and 12 months and consumed unhealthy snacks less often at 12 months post-baseline.

Conclusions: In this study, the intervention was not effective in changing dietary and PA behavior. Moderation analyses suggest that this may partly be due to sub-optimal use of the intervention components. Further research should focus on improving intervention use.

Effect of a family-based lifestyle intervention on (co-)physical activity and other health-related outcomes of fathers and their children: The Run Daddy Run intervention.

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Purpose: Fathers play a unique and important role in shaping their children's physical activity (PA), but are rarely engaging in parenting programs. Lifestyle targeting fathers and their children are therefore a novel and promising way to improve PA of both. A theory-based lifestyle intervention to improve (co-)PA in fathers and children was co-created with fathers. The aim of this study was to investigate the effects of the Run Daddy Run intervention on (co-)PA as the main outcome, and a host of physical, psychological and family secondary outcomes.

Methods: A total of 90 fathers and one of their children (6-8 years old) participated in the study (control group (n=55); intervention group (n=35)). The Behavior Change Wheel was used as a theoretical framework to develop the Run Daddy Run intervention, combined with a co-creation approach. The proposed intervention consisted of 6 (inter)active father-child sessions and an eHealth component, delivered over a 14-week intervention period. However, due to COVID-19, only 2/6 face-to-face sessions could be implemented as planned, the remaining sessions were delivered using online activities. Baseline measurements were conducted between November 2019 and January 2020, post-test measurements in June 2020 with (co-)PA as the main outcome variable. Follow-up measurements were conducted in November 2020. Outcomes were measured using accelerometry and an online questionnaire. Linear mixed models were used to evaluate the effects of the intervention, using SPSS 26.0.

Results: The intervention was effective in improving co-PA of fathers and children on weekdays ($p=0.010$) and weekend days ($p=0.025$), MPA of the father ($p=0.027$) and LPA of the child ($p<0.001$). Positive intervention effects were also found for SB, some parental practices and psychosocial determinants of (co-)PA (all $p<0.05$). No effects were found for BMI, and an inverse intervention effect was found for MPA and VPA of the child.

Conclusions: The positive intervention effects have important implications for future research and health policy, where targeting fathers might be a novel and effective approach to improve health and health behaviours in children. However, more efforts should be made to invest in MPA in children and VPA in children and fathers.

**O2.18 - Participatory approaches and perspectives in behavioral
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Exploring adolescent boys' understanding, perceptions and experiences of muscular fitness activity

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Purpose: English youth typically do not sufficiently engage in the types and intensities of physical activity (PA) that develop muscular fitness (MF). The aim of this study was to use a combination of qualitative techniques to explore adolescent boys' knowledge, understanding, perceptions and experiences of MF activity. It was envisaged that the contextual information gathered from this study would provide novel insights into the meanings adolescent boys ascribe towards MF activity.

Methods: Thirty-two adolescent boys aged 14-16 years from northwest England were recruited. Focus groups generated three separate sources of data, a frequency count (thoughts and perceptions of PA), write/draw (WDST) data, and verbatim transcripts which were triangulated. Data were first analysed deductively using the Youth Physical Activity Promotion Model as a thematic framework and then inductively.

Results: Physical activity knowledge specifically relating to MF and recommended guidelines was limited. Physical activity was frequently associated with organised sport. Opportunities to conduct MF activity were perceived as limited with no structured exposure available. Enjoyment, masculinity, and competence were predisposing factors to MF activity. The school environment served as both an enabler (e.g., access to equipment) and a barrier (e.g., lack of appropriate teaching and support through physical education) to MF activity. Friends were frequently reported as a reinforcing factor to PA participation. Data from the WDST activity suggested that traditional team sports conducted in a school environment were the predominant form of PA opportunity.

Conclusions: Our results demonstrate a lack of knowledge surrounding PA guidelines amongst adolescent boys, particularly around MF activity. A desire to demonstrate a level of competency in activities that are deemed masculine may be satisfied through the delivery of MF activity and appeal to adolescent boys as an attractive form of PA. Despite the importance of MF in the healthy development of adolescents, there is a perceived lack of opportunity to participate in MF activity. The contribution of school-based PE is highlighted as key to facilitating exposure to MF activity and PE programmes should ensure opportunities for MF development through engagement in developmentally appropriate activities.

A Formative Evaluation of a Home-Based Physical Activity Intervention for Adolescent Girls—The HERizon Project: A Randomised Controlled Trial

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Purpose. The HERizon Project is a home-based multi-component physical activity (PA) intervention for adolescent girls in the UK and Ireland. This study was a formative evaluation of its implementation during the initial COVID-19 lockdown restrictions.

Methods. 42 female participants aged 13 to 16 years old (mean = 14.2, SD = 1.1), were randomly allocated to: (i) the HERizon intervention group (n = 22) or (ii) a wait-list control group (n = 20). Participants in the six-week intervention group were asked to complete three PA sessions of their choice each week, engage in weekly need-supportive videocalls with an Activity Mentor, and had access to live workouts and a private social media group. The primary outcome was self-reported habitual PA. Secondary outcomes included cardiorespiratory fitness (20 m shuttle run), muscular strength (standing long jump), muscular endurance (push up test), and psychosocial outcomes (Perceived Competence Scale, Body Appreciation Scale, Self-Esteem Questionnaire, Behavioural Regulation in Exercise Questionnaire). Outcome measures were assessed at baseline and after the six-week intervention. Quantitative and qualitative process evaluation data were also collected which included online interviews (n = 10). Linear mixed modelling and reflexive thematic analysis were used to analyse the data.

Results. There was no significant change in habitual PA between groups ($p = 0.767$). The intervention group had significantly increased cardiorespiratory fitness ($p = 0.001$), muscular endurance ($p = 0.022$), intrinsic motivation ($p = 0.037$), and body appreciation ($p < 0.003$) in comparison to the wait-list control group. All participants in the intervention group completed the intervention and compliance to the intervention was high (participants completed 18 ± 2 sessions). The live workouts, behaviour change support and routine were identified as key facilitators to adhering to the programme. Benefits of the programme reported during interviews included increased enjoyment of exercise, increased confidence and improved performance.

Conclusions. Although no change in PA was observed, HERizon resulted in improved physical fitness and psychosocial outcomes. These preliminary findings, alongside positive findings for feasibility and acceptability, highlight potential benefits from the home-based intervention, thus further investigation is warranted. Future trials should include accelerometers for a more accurate measurement of habitual PA.

Developing an intervention promoting healthy weight development during infancy: Home health visitors' and parents' perceptions of potential barriers regarding an intervention

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Special Interest Group: G. Children and families (SIG)

Background: Childhood obesity is a major public health challenge and it is recommended to promote a healthy weight development already during infancy. Danish home health visitors cover almost all families with a new-born child. This leaves a huge potential for an early intervention to promote healthy weight development. According to the Intervention Mapping framework it is important to understand the characteristics of the setting and the individuals, who will be involved in the intervention, and therefore needs assessment is fundamental to understand potential barriers.

Purpose: This study examines Danish health visitors' perceptions of barriers for delivering an intervention promoting healthy weight development. Furthermore, parents' perceptions of barriers regarding an intervention promoting healthy weight development of their child is studied.

Method: Interviews with health visitors and managing health visitors from twenty Danish municipalities were carried out (n=22). Furthermore, seven interviews with parents of infants less than one year of age were conducted. Parents were strategically sampled representing variations across child's age, family socioeconomic position, migration status and geography. Both the interviews with health visitors and parents were based on a semi-structured interview guide.

Results: Barriers were identified on different levels. Organizational barriers within the work of health visitors included lack of economic resources and political priority especially regarding the possibility to monitor children's weight development more frequently and for a longer period. Furthermore, health visitors lacked relevant tools to guide parents about promoting healthy weight development. Interpersonal barriers between health visitors and parents were identified as the difficulties of having conversations about healthy weight development, especially if the parents or health visitors were overweight themselves. Cultural differences including language barriers and different perception of for example healthy food choices were also found. Furthermore, barriers in families included that parents found it difficult to navigate in large amounts of information concerning healthy weight development of their child and difficulties of being good role models.

Conclusions: It is important to understand the potential barriers when developing a new intervention. Involving parents and health visitors in the development of an intervention aims at increasing the chances of producing a relevant, successful, and sustainable intervention.

Adolescents' perspectives on the drivers of obesity using a group model building approach

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Special Interest Group: G. Children and families (SIG)

Purpose: Overweight and obesity increases the risk for a range of poor physiological and psychosocial health outcomes. Previous work with well-defined cohorts have explored the determinants of obesity employed various methods and measures, however, less studies have focussed on the broader societal influences, beyond individual-level influences using a systems framework. The aim of this study was to explore the drivers of obesity from adolescents perspectives using a group model building approach.

Methods: Collaborative, conceptual mapping workshops were held with a group of 60 adolescents (16-18 years). The adolescents built a systems model to generate maps in the form of causal loop diagrams to determine the drivers of obesity. These maps were merged into one finalised map. Within the final map, feedback loops were identified and recognition of opportunities for policy intervention were discussed.

Results/findings: The work of adolescents (N=60), engaged in separate system mapping groups, generated four comprehensive causal loop diagrams. The finalised, merged diagram exhibits six important sub-themes: (i) use of social media; (ii) affordability and accessibility of unhealthy food; (iii) outdoor safety; (iv) psychological health; (v) knowledge of health-related behaviours and (vi) domestic discord.

Conclusions: Despite the limited empirical evidence available, our study presents meaningful, complex and policy-relevant insights into the drivers of obesity. This approach, both the process of construction and the final visualisation, provides a basis for planning the prevention and improvement of obesity that engages with multiple levels of causes and existing policies. Interventions to address obesity need to address psychosocial challenges, advertisement through social media and affordability and accessibility of unhealthy food. This, however, demands for a broad understanding across a variety of individual and social levels.

Children as architects: A realist synthesis of motor competence and physical activity behaviour change interventions

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Special Interest Group: G. Children and families (SIG)

Purpose: Research including young people in the design of interventions, report an increased awareness of healthy behaviours and an improvement in confidence and feelings of empowerment. Traditional systematic review methodology aims to provide a summary of the effectiveness of interventions in terms of their effect sizes. This does not take in to account the complexity of movement development or the relationship between researcher and child. The aim was to understand the complex research that includes children in the design of physical activity (PA) and motor competence (MC) interventions.

Methods: A novel approach within MC and PA research. Combining a systematic review following PRISMA guidelines and realist synthesis following RAMSES quality and publication guidelines.

Studies included all of the criteria: PA behaviour and/or motor competence, school aged children (5-18 years), able bodied participants, children involved in the intervention design, level of involvement clearly evidenced. Studies were excluded if they identified as 'top-down', addressed perceived PA opportunities and barriers with no follow up intervention or were designed by children not included in the intervention.

Study characteristics and primary data extracted through the Mixed Methods Appraisal Tool (MMAT) and inductive and realist thematic analysis. Hypothesis research framework created to extract additional data and complete realist analysis.

Findings: Full text of 93 publications retrieved out of 51,739. 9 studies fulfilled all inclusion criteria, verified by second researcher. Mixed method studies and companion papers, included RCT's, process evaluations, feasibility and case studies. Realist synthesis provided rich, social context to the complexity of MC and PA behaviours. How youth are engaged is important, it must be developmentally and culturally suitable. All studies reported a sense of empowerment or self-efficacy however, the only studies to improve PA had greater involvement of youth. Youth as researchers may negate cultural barriers to PA participation and enjoyment.

Conclusions: Research that shares power and knowledge with our youth may elicit greater results at increasing PA and MC. When delivered in the knowledge that youth are assets, following a behavior theory we may have the opportunity to empower disadvantaged and at risk groups to take control of their health behaviours.

**O2.19 - Epidemiological and intervention research on physical activity
and sedentary behavior in older adults,
June 9, 2021**

Sex-specific typologies of older adults' sedentary behaviors and their associations with health-related and socio-demographic factors: a latent profile analysis

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Special Interest Group: A. Ageing (SIG)

Purpose: Some types of sedentary behaviors tend to cluster in individuals or groups of older adults. Insight into how these different types of sedentary behavior cluster is needed, as recent research suggests that not all types of sedentary behavior may have the same negative effects on physical and mental health. Therefore, the aim of this study was to identify sex-specific typologies of older adults' sedentary behavior, and to examine their associations with health-related and socio-demographic factors.

Methods: Cross-sectional data were collected as part of the BEPAS Seniors, and the Busschaert study among 696 Flemish older adults (60+). Typologies of self-reported sedentary behavior were identified using latent profile analysis, and associations with health-related and sociodemographic factors were examined using analyses of variances.

Results: Five distinct typologies were identified from seven sedentary behaviors (television time, computer time, transport-related sitting time, sitting for reading, sitting for hobbies, sitting for socializing and sitting for meals) in men, and three typologies were identified from six sedentary behaviors (television time, transport-related sitting time, sitting for reading, sitting for hobbies, sitting for socializing and sitting for meals) in women. Typologies that are characterized by high television time seem to be related to more negative health outcomes, like a higher BMI, less grip strength, and a lower physical and mental health-related quality-of-life. Typologies that are represented by high computer time and motorized transport seem to be related to more positive health outcomes, such as a lower body mass index, more grip strength and a higher physical and mental health-related quality-of-life.

Conclusions: Although causal direction between identified typologies and health outcomes remains uncertain, our results suggest that future interventions should better focus on specific types of sedentary behavior (e.g. television time), or patterns of sedentary behavior, rather than on total sedentary behavior.

Life-course leisure-time physical activity trajectories in relation to health-related behaviors in adulthood: The Cardiovascular Risk in Young Finns Study

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Special Interest Group: A. Ageing (SIG)

Background: Evidence on whether leisure-time physical activity (LTPA) facilitates individuals' adoption of multiple healthy behaviors remains scarce. This study investigated the associations of longitudinal LTPA trajectories from childhood to adulthood with diet, screen time, smoking, binge drinking, sleep difficulties, and sleep duration in adulthood.

Methods: Data were drawn from the Cardiovascular Risk in Young Finns Study. Participants were aged 9-18 years (N=3553; 51% females) in 1980 and 33-49 years at the latest follow-up in 2011. The LTPA trajectories were identified using a latent profile analysis. Differences in self-reported health-related behaviors across the LTPA trajectories were studied separately for women and men. Models were adjusted for age, BMI, education level, marital status, total energy intake and previous corresponding behaviors.

Results: Persistently active, persistently low-active, decreasingly and increasingly active trajectories were identified in both genders and an additional inactive trajectory for women. After adjusting the models, the inactive women had an unhealthier diet than the women in the other trajectories ($p<0.01$; effect size(ES) >0.50). The low-active men followed an unhealthier diet than the persistently and increasingly active men ($p<0.01$; ES >0.50). Compared to their inactive and low-active peers, smoking frequency was lower in the increasingly active women and men ($p<0.01$; ES >0.20) and persistently active men ($p<0.05$; ES >0.20). The increasingly active men reported lower screen time than the low-active ($p<0.001$; ES >0.50) and persistently active ($p<0.05$; ES >0.20) men. The increasingly and persistently active women reported fewer sleep difficulties than the inactive ($p<0.001$; ES >0.80) and low-active ($p<0.05$; ES >0.50 and >0.80 , respectively) women. Sleep duration and binge drinking were not associated with the LTPA trajectories in either gender, nor were sleep difficulties in men and screen time in women.

Conclusions: Not only persistently higher LTPA but an increasing tendency to engage in LTPA after childhood/adolescence were associated with healthier diet and lower smoking frequency in both genders, having less sleep difficulties in women and lower screen time in increasingly active men. Inactivity and low activity were associated with the accumulation of several unhealthy behaviors in adulthood. Associations were stronger in women.

Joint changes in physical activity and adiposity over time and cause-specific mortality among 146,530 MJ Cohort participants follow up for 14 years

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Special Interest Group: A. Ageing (SIG)

Purpose The effects of concurrent changes in adiposity and physical activity over time with mortality are not well understood. In this study we examined the joint-association of changes in adiposity and physical activity with cardiovascular disease (CVD), cancer, and all-cause mortality. We also examined the dose-response associations of changes in abdominal adiposity with mortality across changes in physical activity categories

Methods A repeated measures analysis of 146,062 men and women (age = 37.0 ± 12.4 ; female = 50.5%) from the MJ prospective cohort. Linear regression against elapsed time was used to calculate overall physical activity and adiposity change. Participants were categorized into sex-specific tertiles of physical activity and waist to hip ratio. Hazard ratio (HRs) and 95% confidence intervals (CIs) were estimated using Cox proportional hazards regression models for all-cause mortality. To estimate joint-associations for cause-specific mortality, we used the Fine-Gray subdistribution method to reduce bias from competing risks. Dose-response relationships for changes in adiposity across physical activity levels were modelled with restricted cubic spline functions.

Results/findings A total of 7,405 deaths (1,451 due to CVD and 3,163 due to cancer) occurred during 2,011,063 person-years and an average follow-up of 13.8 years (4.8) years. There was a statistically significant interaction between changes in adiposity and physical activity ($p < 0.01$). The dose-response curve of changes in adiposity across physical activity level was U-shaped. Adiposity stability over time was associated with significant reductions in mortality risk, regardless of changes in physical activity. The largest reductions for all-cause mortality risk were among participants who maintained adiposity levels and concurrently maintained (HR [95%CI]: 0.36 [0.31-0.41]) or increased (0.38 [0.34-0.44]) physical activity. Among participants with stable adiposity, similar patterns were observed for CVD and cancer mortality risk among physical activity maintainers and increasers (e.g. the CVD mortality risk was 0.37 [0.27-0.50]) for maintainers and (0.34 [0.25-0.46]) for increasers). We observed similar results for BMI

Conclusion Fluctuations in adiposity over time were associated with increased CVD, cancer, and all-cause mortality. Our results suggest that adiposity stability while preventing reductions in physical activity over time may mitigate mortality risk.

Does electrically-assisted cycling leads to more cycling and better health? An observational longitudinal study among Flemish and Dutch older adults

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Special Interest Group: A. Ageing (SIG)

Purpose: Electrically-assisted bicycles (EAB) may offer an opportunity to maintain or increase older adults' cycling levels and consequently their health, functionality and life space area. However, there is a dearth of research on the longitudinal effects of EAB, particularly in a non-experimental setting and among older adults. This observational longitudinal study aimed to examine the effects of EAB use on older adults' cycling frequencies, self-rated health, functionality and life space area.

Methods: Baseline survey data were collected among 887 Flemish and Dutch older cyclists (≥ 65 years) who were recruited through several channels (e.g., a research panel, senior organizations). One year later, 225 older adults (response rate= 25.4%) completed follow-up measurements. Participants self-reported socio-demographics, frequencies of conventional and electrically-assisted cycling, self-rated health, functionality and life space area. Participants were classified into four EAB groups; not using EAB at both time points ($n=113$), using EAB at both time points ($n= 86$), started using EAB ($n= 17$) and stopped using EAB ($n= 9$). Non-parametric repeated measures ANOVAs and Wilcoxon signed rank tests were applied.

Results: A significant interaction effect between time and EAB group was observed for total cycling frequency ($F= 11.4$, $df= 3$, $p<0.001$). Total cycling frequency significantly decreased in those not using EAB at both time points ($z= -3.1$, $p<0.01$, effect size $r= -0.3$), those using EAB at both time points ($z= -2.6$, $p= 0.01$, $r= -0.3$) and those who stopped using EAB ($z= -2.7$, $p<0.01$, $r= -0.9$). Total cycling frequency significantly increased among those who started using EAB ($z= -3.2$, $p= 0.001$, $r= -0.8$). A significant interaction effect between time and EAB group was observed for functionality ($F= 5.5$, $df= 3$, $p= 0.001$). Functionality non-significantly decreased in all EAB groups, except among those who stopped using EAB for whom functionality remained stable. No significant interaction effects were observed for self-rated health and life space area.

Conclusions: Policies stimulating EAB use may increase cycling levels among older adults. Future studies with longer follow-up periods should examine effects of EAB use on (objectively-assessed) total physical activity levels and health outcomes and potential harmful effects (i.e. crash risk).

The feasibility of the JitaBug personalised mHealth just-in-time adaptive intervention targeting physical activity in older adults

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Special Interest Group: D. e- & mHealth (SIG)

Purpose: Just-in-time-adaptive-interventions (JITAI) provide real-time 'in the moment' behaviour change support to people when they need it most. JITAI can be delivered via smartphones, at scale, to target populations, but none so far have targeted older adults. This study describes the feasibility of delivering a novel, personalised, JITAI designed to support older adults to increase their physical activity (PA) level.

Methods: Using the Behaviour Change Wheel and COM-B framework, we developed a mobile app (JitaBug) that delivered just-in-time prompts tailored using real-time PA data (Fitbit Charge 4) and weather conditions, to encourage achievement of personalised PA goals. We tested the feasibility of the JITAI with older adults in a 6-week trial using a mixed-methods approach. The intervention was delivered entirely remotely. Physical activity was measured using a wrist-worn accelerometer during a baseline and follow-up period, and using intra-day Fitbit data throughout the intervention. Contextual details on PA were gathered using a voice-based ecological momentary assessment approach (snippets). Mental wellbeing was assessed weekly and mood was assessed twice weekly using short forms of the Warwick-Edinburgh Mental Wellbeing Scale and the Multidimensional Mood State Questionnaire, respectively. Feasibility outcomes included: (1) recruitment and retention, (2) intervention fidelity, (3) data collection processes and identification of missing data.

Results: Initially, 46 participants consented to participate but 5 withdrew prior to, and 10 withdrew during, the intervention. In total, 31 older adults (mean \pm SD; 65.5 \pm 5.4 years) completed the intervention. The fidelity of the intervention was high; 27 participants were successfully onboarded and set activity goals, 94% of PA message prompts were successfully delivered, and 99% of Fitbit and 100% of weather data calls were successful. Accelerometer data were obtained from 96% at baseline and 96% at follow up. Of a possible 496 snippets, 212 (43%) valid recordings were obtained. On average, participants recorded 8/16 (50%) snippets, 3/8 (38%) mood assessments, and 2/4 (50%) wellbeing assessments via the app.

Conclusions: Smartphone-delivered JITAI are a feasible way to reach older adults and provide them with remote support to increase their PA level. While low-burden self-report assessments are possible via smartphones, passive sensing is more successful.

S2.09 - Understanding physical activity in parents – state of the evidence and future directions, June 9, 2021

Chair: Rachel Simpson, PhD Student, University of Cambridge

Discussant: Adam Evans, Associate Professor, University of Copenhagen

Purpose: The symposium explores the breadth of research which has been conducted relating to parental physical activity and the importance of conducting research on this topic. We will present a scoping review of the relevant literature and results from both a quantitative and a qualitative study examining parental physical activity.

Rationale: Physical activity is beneficial for both physical and mental health. In addition to these general population benefits, there are also parent-specific advantages associated with being physically active, such as nurturing relationships with children through co-participation and providing a means of dealing with the daily challenges of being parent. Despite this, parents have lower levels of physical activity than non-parents. It is vital to understand physical activity behaviour of this group to find ways to increase their physical activity levels.

Objectives: Aims of this symposium are to:

1. To investigate the range of research which has been and is currently being conducted on parental physical activity, identifying knowledge gaps and future directions.
2. To discuss the importance of conducting research on parental physical activity.
3. To prompt discussion between researchers with an interest in parental physical activity to stimulate ideas for future research and collaborations.

Summary: The symposium will be introduced by Dr. Rachel Simpson (University of Cambridge). Three 10-minute presentations will follow. Rachel Simpson will present a scoping review of research conducted on parental physical activity. Vicka Versele (Vrije Universiteit Brussels) will present findings from focus groups exploring determinants of changes in parental physical activity in the first year postpartum. Dr. Arto Laukkanen (University of Jyväskylä) will present results from a geographically representative, randomly sampled longitudinal study examining the bidirectional relationship between parents' and their child's physical activity and physical activity parenting practices across a transition from kindergarten to primary school. To conclude, Dr. Adam Evans (University of Copenhagen) will provide a summary of the session and facilitate discussion amongst presenters and the audience.

Format:

4 mins: Introduction from Rachel Simpson.

10+2 mins: Rachel Simpson: What is the evidence base surrounding parental physical activity? A systematic scoping review of the literature.

10+2 mins: Vicka Versele: Determinants of changes in physical activity behaviour in first-time parents. 10+2 mins: Arto Laukkanen: Bidirectional relationship between parents' physical activity and related parenting practices and child's physical activity: a longitudinal analysis.

20 mins: Structured discussion, led by Adam Evans.

Interaction: The discussant will facilitate discussion both amongst speakers and the audience.

What is the evidence base surrounding parental physical activity? A systematic scoping review of the literature

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Special Interest Group: **G. Children and families (SIG)**

Purpose: Despite the known benefits of physical activity (PA) to physical and mental health, many people fail to achieve recommended PA levels. Parents are less active than non-parent contemporaries, therefore constituting a large potential intervention population. Interventions should be based upon in-depth understanding of the target behaviour and its determinants. This scoping review (based on Arksey and O'Malley's guidelines (2005)) aimed to provide an overview of the current evidence base for parental PA.

Methods: Four databases (Medline, Embase, PsychInfo, Scopus) were systematically searched to identify peer-reviewed articles focusing on parental PA from 2005 onwards, including interventional, observational or qualitative study designs. Title and abstract screening was followed by duplicate full-text screening. Data extracted for all articles, completed by one author and checked by another, included study design, proportion of fathers, and ages of children. PA assessment method and factors examined based on the Socio-Ecological Model for quantitative studies, and questions addressed in qualitative studies were also included. Narrative methods, tabulations and graphs were used to summarise results.

Results: Of 14,913 unique records retrieved, 213 articles were included, some reporting on multiple study designs. 173 articles were quantitative (81 cross-sectional, 26 longitudinal, 76 interventional) and 58 qualitative. Most articles related to North American studies (62%), 53% included mothers only, and 30% and 29% pertained to parents of 0-5s and 0-12s respectively. The majority of quantitative articles only investigated self-reported PA (69%). Individual determinants or correlates were assessed in 90% of observational articles, whilst interpersonal and environmental factors were examined in 27% and 25% of articles respectively. Qualitative articles tended to obtain information from focus groups or group interviews (47%) and from individual interviews (45%). Most qualitative articles explored PA barriers and facilitators (57%).

Conclusions: A range of quantitative and qualitative research has been conducted about parental PA. This review provides scope for conducting systematic reviews of related articles, such as those focused on the PA of parents of specific groups of children. It also identifies gaps and lesser-studied areas in the literature to be filled, for example around paternal PA, to gain a full understanding of parental PA to inform interventions.

Determinants of changes in physical activity behavior in first-time parents

Dra. Vicka Versele^{1,2}, Dr. Marijn Stok³, Prof. Tom Deliens¹, Prof. Dirk Aerenhouts¹, Prof. Benedicte Deforche^{1,4}, Prof. Annick Bogaerts^{2,5}, Prof. Roland Devlieger^{2,6}, Prof. Peter Clarys¹

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Special Interest Group: G. Children and families (SIG)

Purpose: Becoming a parent may cohere with drastic changes in physical activity behavior for both women and men. A clear understanding of determinants of changes in physical activity during the transition to parenthood is needed to facilitate the development of tailored family-based interventions countering unfavorable changes in physical activity behavior during this critical life period.

Methods: Six focus group discussions targeting determinants of changes in physical activity behavior from birth up to one year postpartum were conducted, involving a total of 32 participants (50% women). A semi-structured question guide was used to facilitate the discussions. Main and sub-categories of determinants were derived from the data using an inductive thematic approach.

Results: A framework comprising determinants of changes in physical activity in first-time parents was developed. Four main levels of determinants were identified, namely 1) the individual level, including psychological (e.g., 'self-regulation'), situational (e.g., 'other priorities') and biological (e.g., 'recovery after pregnancy/delivery'); 2) the interpersonal level (e.g., 'influence of the baby'); 3) the environmental level, (e.g., 'attribute prices'); and 4) the policy level (e.g., 'maternity leave'). Determinants acting as barriers (e.g., 'barriers to self-care') or facilitators (e.g., 'weight control') were identified. Several interplays of determinants at different (sub)levels were observed. For example, practical constraints during the postpartum period, such as the difficulty to take the baby with you while sporting were described (at the individual – psychological level), while, at the same time, first-time parents experienced barriers to ask for help or leave their child with others (interpersonal level). Finally, some determinants were mentioned by women (e.g., 'physical activity knowledge') or men (e.g., 'role model') only, whereas others were described by both sexes (e.g., 'planning').

Conclusions: The developed framework sets the foundation for the development of future family-based interventions and may be used by healthcare providers to support and guide women and men towards a physically active parenthood. With this, interactions between (sub)levels should be taken into account. Parents should be sensitized, educated and

supported to find a balance between self- and baby-care, to improve self-regulation skills, and to cope with interpersonal and situational constraints and parenthood perceptions.

Bidirectional relationship between parents' physical activity and related parenting practices and child's physical activity: a longitudinal analysis

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Special Interest Group: G. Children and families (SIG)

Purpose: Physical activity (PA) parenting practices and role modelling are assumed to influence children's PA. However, parents may also change their own PA behaviour and parenting in response to their perceptions of their child's PA. This study examined the bidirectional relationships between parents' perceptions of their own and child's PA and PA parenting practices between children's transition from kindergarten to primary school.

Methods: Questionnaire of the parent's own (weekly exercise frequency (T1-T2); amount of days per week achieving recommended PA level; total of weekly PA hours (T2)) and child's PA (time spent outdoors on weekdays and on weekend days) and PA parenting practices (parent's and his/her partner's logistic and material support, encouragement for PA and coparticipation in PA with the child) was completed by 666 parents (83.5-87.0% female) of the geographically representative Skilled Kids (T1) and Active Family (T2) studies in Finland. Means of the PA and PA parenting estimates were used in the analyses. Children attended kindergarten at T1 (mean age 5.55±1.08 years, minimum 3, maximum 8 years) and primary school at T2 (mean age 8.76±1.07 years, minimum 6.33, maximum 11.44 years). Hierarchical linear regression models were used to examine associations between the parent's and child's PA and PA parenting practices. All the models were adjusted for the child's age and sex, and for the parent's sex and educational level at T2.

Results: PA parenting practices at T1 predicted significantly ($p<.001$, 8.8%) child's PA at T2, whereas parent's PA at T1 was not a significant independent predictor of child's PA at T2 ($p=.169$, 0.3%). Child's PA at T1 was a significant independent predictor of PA parenting practices ($p<.001$, 7.1%) and parent's PA ($p<.001$, 4.2%) at T2.

Conclusions: The results show that parents and children mutually influence each other's PA related behaviours. In detail, there may be a reinforcing interaction between child's PA and PA related parenting practices, but only child's PA may affect parent's PA but not vice versa. The bidirectional association between children and parents should be considered when developing tools for enhancing children's and/or parents' PA.

S2.10 - Disruptions to physical activity and sedentary behavior patterns during the Covid-19 pandemic: A goal-based perspective, June 9, 2021

Chair/Discussant: Benjamin Gardner, Senior Lecturer, King's College London

Purpose: Although researchers view physical activity (PA) and sedentary behaviour (SB) as health-related, PA and SB are often incurred as by-products of pursuing non-health goals. This symposium explores one potential explanation for PA and SB change during the 2020 Covid-19 pandemic, which is that social distancing measures affected the instrumentality of PA and SB for achieving valued goals. Implications of the goal-based perspective for PA promotion are discussed. **Rationale:** The 2020 Covid-19 pandemic led to the imposition of social distancing measures, including stay-at-home orders and closure of non-essential businesses, to control coronavirus transmission. PA was encouraged as a means of maintaining health and wellbeing, but PA levels tended to decrease, and SB increased, during the pandemic. This symposium expounds the idea that the pandemic disrupted PA and SB patterns in part because of changes in goal prioritisation, or the instrumentality of PA for achieving common goals.

Objectives: The symposium will:

- (1) Present illustrative evidence of changes in PA during the Spring 2020 UK national lockdown.
- (2) Offer theory and evidence-based reasoning to understand PA and SB as by-products of pursuing higher-order goals.
- (3) Highlight the impact that social distancing measures had on goal prioritisation, and the extent to which PA and SB continued to serve everyday goals, such as completing work tasks among home-workers.
- (4) Encourage discussion of ideas around the implications of a goal-based perspective for understanding and promoting PA. **Summary:** Naughton will present longitudinal UK cohort study data, showing how and for whom PA changed during the Spring 2020 national lockdown. Gardner will review theories and evidence to argue that, during the 2020 Covid pandemic, many people prioritised goals not served by PA, or continued to pursue goals that, following social distancing measures, incurred lower levels of PA and greater SB than usual. Keightley will present a qualitative study testifying that, among usually office-based workers, PA and SB changed in part due to adjustments in working practices for home-workers. Discussant Smith will draw on insights from his extensive Covid-related PA research to lead audience-driven discussion of the implications of a goal-based analysis for understanding pandemic-related changes to PA. **Interaction:** Questions and comments posted by audience members to the virtual chat function will be collated in real-time by the Discussant, who will moderate discussion of these and other pertinent issues at the session end.

Changes in physical activity due to the first Covid-19 lockdown in the UK: an intensive longitudinal cohort study

Dr. Felix Naughton¹, Dr. Emma Ward¹, Mr. Jack Dainty¹, Dr. Mizanur Khondoker¹, Dr. Sarah Hanson¹, Dr. Pippa Belderson¹, Prof. Anne Marie Minihihane¹, Prof. Richard Holland², Dr. Tracey Brown¹, Prof. Caitlin Notley¹

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Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: i) identify initial changes in physical activity behaviours due to the first UK Covid-19 lockdown; ii) identify participant characteristics which predicted changes in activity levels; iii) identify different trajectories (clusters) and cluster membership of activity change throughout the full three-month lockdown period.

Methods: A prospective cohort (N=1,044) of people recruited online, purposively targeting vulnerable populations. After a baseline survey (April 2020), participants completed 3 months of daily ecological momentary assessments (EMA). The number of days where >30 minutes of moderate to vigorous physical activity (MVPA) and where resistance training was undertaken was collected retrospectively for the pre-COVID-19 period and compared with daily EMA surveys over the first 7 days of measurement during early lockdown. Predictors of activity change were assessed using multivariable regression models. K-means clustering was used to identify different clusters representing different MVPA trajectories from April to July 2020. Analyses were pre-registered on the Open Science Framework.

Results: 30% of the cohort had a COVID-19 at risk health condition, 37% were classed as deprived and 6% self-reported a mental health condition. Relative to pre-pandemic levels, participants spent half a day less per week doing ≥30 minutes of MVPA (-0.57, 95% CI -0.73, -0.40) but slightly increased days of strength training (0.21, 95% CI 0.09, 0.34). Worsening MVPA levels during early lockdown were associated with having a Covid-19 at risk health condition, higher deprivation, younger age, and higher body mass index. Reduced strength training was associated with not being a keyworker and higher BMI. Over the full three-month lockdown period, two stable clusters of MVPA levels were identified – a low MVPA cluster (81% of sample) and a high MVPA cluster (19%). Membership of the low MVPA cluster was more likely among those of lower age and higher BMI.

Conclusions: The cohort reported an overall reduction in physical activity during early lockdown relative to pre-pandemic levels and this remained throughout the lockdown period. Younger age and higher BMI were key predictors of lower levels of physical activity.

Goal priorities and physical activity: the example of the Covid-19 pandemic

Dr. Benjamin Gardner¹

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Special Interest Group: **B. Motivation and behavior change (SIG)**

Purpose: Researchers often tacitly assume that people pursue – or should pursue – physical activity (PA) as a means to achieve health benefits. This assumption fails to acknowledge that PA, and sedentary behaviour (SB), are often by-products of pursuing higher-priority goals unrelated to health. From this perspective, many people fail to engage in recommended levels of PA because it lacks compatibility with personally valued goals. This talk proposes that the Covid-19 pandemic led to the general public prioritising goals and actions that were prohibitive of PA but highly compatible with sitting time.

Methods: A review is presented of key tenets from theories of action construal (e.g., Action Identification Theory), hierarchical accounts of action (e.g., Cooper-Shallice model), and goal-focused theories (e.g., Control Theory), and evidence from empirical studies applying such theories to PA and SB. These insights are subsequently applied as a framework for interpreting evidence around the priorities of the general public during the Covid pandemic in 2020, and how these relate to observed changes in PA during the pandemic.

Results: Together, theories and empirical evidence suggest that people often do not engage in PA or SB to be 'active' or 'sedentary' per se. Rather, PA and SB are incidentally incurred by pursuing higher-order, longer-term goals – for example, people sit in seated workplaces not because they are motivated to sit per se, but because sitting allows them to efficiently execute work tasks, which serves career goals. Health-related concerns voiced by the public during the pandemic point to the prioritisation of goals that precluded PA but were conducive to SB, such as minimising socialising to control infection risk. Government-imposed restrictions – e.g., stay-at-home orders – and their sequelae, such as home-working, also likely limited PA.

Conclusions: Whether people engage in PA will depend on whether PA serves prioritised goals. For many people, the 2020 Covid pandemic raised the salience of goals for which PA was not essential. Outside of the Covid context, interventions might fruitfully focus on promoting PA, and discouraging sitting, by emphasising how PA can fit with, and ideally facilitate, pursuit of personally valued goals.

Changes to work practices and incidental physical activity and wellbeing among home-workers during the UK COVID-19 lockdown: A qualitative study

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Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: Covid-related restrictions, including national lockdowns, are known to have prompted decreases in physical activity and increases in sedentary behaviour for many people. Working practices are known to incidentally affect physical activity; for example, people accrue many of their daily steps on the daily commute, and computer-based work entails prolonged sitting. This qualitative study aimed to examine how changes in work practices among people working from home affected physical activity, sedentary behaviour and wellbeing during the UK national lockdown of Spring 2020.

Methods: Twenty-seven full-time, normally-office-based employees (19 female, 8 male; age range 23-57y) who were working from home due to the national lockdown, participated in individual semi-structured interviews during the lockdown (March-June 2020). Topics focused on experiences of home-working, adaptations of working routines, and changes in health behaviours including physical activity and sitting. Verbatim transcripts were analysed using Thematic Analysis procedures.

Results: Four themes were extracted, each reflecting a form of modification to work practices that affected physical activity and sitting patterns: (1) social connectivity, (2) the work interface, (3) work-life balance, and (4) physical and psychological organisation of workspaces. For example, the predominance of computer-based interaction, and the removal of ad hoc in-person work-related interactions, reduced movement and prolonged sitting by removing potential cues to breaks from screen time. Additionally, discontinued exposure to settings or events that demarcate work and leisure activities – e.g., dedicated working spaces and daily commuting routines – not only removed opportunities to psychologically transition between work and leisure time, but also reduced the need for incidental activity. Participants thus reported a blurring of boundaries and difficulty ‘switching off’ from work tasks, as well as reduced activity. Homeworking also appeared to impact dietary behaviours via greater physical proximity to food, and incidental increases in flexibility and time available for preparing healthy meals.

Conclusions: Our results highlight the importance of identifying how the pursuit of achieving home-working goals incidentally impacts physical activity and other health-related behaviours, and so wellbeing. Employers might actively encourage work practices conducive to greater movement, such as walking meetings or regular breaks.

S2.11 - Online, in-store and neighbourhood food environments, June 9, 2021,

Chair: Joreintje Mackenbach, Assistant Professor, Amsterdam UMC

Discussant: Coosje Dijkstra

Purpose: To advance food environment research through presenting and discussing the findings from studies addressing online, in-store and neighbourhood-level aspects of the food environment in relation to dietary outcomes.

Rationale: The unhealthy food environment is a dominant driver of unhealthy diets. The food environment can be operationalized on different levels (e.g., neighbourhood-level, store-level, home-level) and represents various aspects (e.g., availability, perceptions, salience, price). In this symposium we will touch upon several aspects that are dependent on the context in which the research is conducted. For example, what aspects of the food environment are considered unhealthy; the underlying mechanisms explaining associations with diet; and what tools are effective in helping individuals making healthier choices. We will do so by showcasing neighbourhood-level availability and use of food retailers in Brazil; in-store sugar-labelling in Dutch supermarkets and the application of nudges during online shopping; and the links between these levels and aspects.

Objectives: To

- 1) present novel research from Brazil on the importance of incorporating interactions between individuals and their environment, and findings from a natural experiment regarding on-shelf sugar labelling conducted in a Dutch supermarket chain as well as the results from a nudging experiment in an online supermarket in the Netherlands;
- 2) provide a critical reflection on the study findings and their research and policy implications; and
- 3) stimulate a lively discussion on the ways in which this field of research can be moved forward. Summary: This symposium will combine the learnings from three studies conducted in different food environment settings to discuss the ways in which food environment research can be advanced. We invite the attendees for a critical discussion on conceptual frameworks, in- and explicit assumptions underlying the research, validity of methods used and identification of research gaps.

Format: JD Mackenbach (chair) will briefly introduce the session, provide background regarding food environments research and invite the attendees to actively engage in the discussion (7 minutes). MGM Pinho, JC Hoenink and JM Stuber will present their research question, methods used and interpretation of their results (10 minutes each). MP Poelman (discussant) will provide a reflection on the study findings and their coherence (8 minutes) and facilitate a lively discussion between presenters and audience (15 minutes).

Interaction: We will use interactive apps such as Mentimeter and Buzzmaster, and –if possible- allow attendees to propose discussion points and ask questions via mail or the conference app before the session.

Nudging to increase healthy foods and beverages purchases in a real-life online supermarket: A randomized controlled trial

Miss Josine Stuber^{1,2}, Dr. Jeroen Lakerveld^{1,2}, Assistant Professor Joreintje Mackenbach^{1,2}, Prof. Joline Beulens^{1,2,3}

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Special Interest Group: H. Policies and environments (SIG)

Purpose: To evaluate the effectiveness of online healthy food nudging on healthy food purchasing behaviors in a real-life online supermarket, and to test the potential differential effects of nudging across food groups, and whether these effects were modified by neighborhood socioeconomic position (SEP).

Methods: Over the course of five constructive weeks, online grocery shoppers were randomly assigned to one of four versions of a Dutch online supermarket: Control group: regular online supermarket; Group 1: product labels (three types of symbols) on healthy products; Group 2: unhealthy product swap suggestions and healthy check-out suggestions; Group 4: groups 2 and 3 combined. Sales data from all food and beverage products were retrieved from the supermarket chain. Linear mixed models were used to assess the mean differences between the control group and the intervention groups in the percentage of all healthy food purchases (primary outcome). Nonparametric bootstrapping for hierarchical data was used to investigate differences across all food groups and we tested for effect modification by neighborhood SEP.

Results: Sales data from 11,775 individual shops were analyzed. Among costumers from low SEP neighborhoods, those in group 1 purchased a 2.39% (95%CI=0.82,3.96) higher percentage of healthy products compared to the control group. No significant differences were observed in group 2 ($\beta=-1.29$; 95%CI=-2.84,0.27) and group 3 ($\beta=-0.10$; 95%CI=-1.69,1.48) compared to the control group. For costumers from high SEP neighborhoods, those in group 1 ($\beta=-1.61$; 95%CI=-3.17,-0.06) and group 3 ($\beta=-2.12$; 95%CI=-3.64,-0.60) purchased a significant lower percentage of healthy products, whereas this difference was non-significant in group 2 ($\beta=-0.85$; 95%CI=-2.39,0.69). Evaluation of differences across food groups revealed that the groups of pasta and rice (Group 3: $\beta=7.63$; 95%CI=2.36,12.68) and milk and yogurt (Group 1: $\beta=4.62$; 95%CI=0.47,8.81) mostly drove the overall higher percentage of healthy purchased among those with a lower SEP.

Conclusions: Online nudging strategies seem to benefit those living in lower SEP neighborhoods as they purchased a higher percentage of healthy products per shop, particularly from healthier purchases of grains and dairy. Further research is needed to better understand the potential adverse effects on purchasing behaviors for those living in higher SEP neighborhoods.

The effect of on-shelf sugar labeling on beverage sales in the supermarket: a comparative interrupted time series analysis of a natural experiment

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Special Interest Group: H. Policies and environments (SIG)

Purpose Nutrition labels show potential in increasing healthy beverage purchases, but their effectiveness seems to depend on the type of label, the targeted category and the setting, and evidence on their impact in real-world settings is limited. The aim of this study was to evaluate the effectiveness of on-shelf sugar labeling on the sales of beverages with no, low, medium and high sugar content implemented within a real-world supermarket.

Methods In week 17 of 2019, on-shelf sugar labels were implemented by a Dutch supermarket chain. Non-alcoholic beverages were classified using a nutrient-specific traffic-light labeling system and included the beverage categories “green” for sugar free (<1.24g/250ml), “blue” for low sugar (1.25–6.24g/250ml), “yellow” for medium sugar (6.25–13.5g/250ml) and “amber” for high sugar (>13.5g/250ml). Store-level data on beverage sales and revenue from 41 randomly selected supermarkets for 13 weeks pre-implementation and 21 weeks post-implementation were used for analysis. In total, 30 stores implemented the on-shelf sugar labels by week 17, and the 11 stores that had not were used as controls. Outcome measures were differences in sale changes between the control stores and implementation stores of the four beverage categories and the total beverage revenue. Analyses were conducted using a multiple-group Interrupted Time Series Approach. Results of individual store data were combined using random effect meta-analyses.

Results The change in green (B 3.4, 95%CI -0.3; 7.0) and blue (B 0.0, 95%CI -0.6; 0.7) beverage sales was not statistically significantly different between stores that did or did not implement on-shelf sugar labels. Similar to green and blue beverages, the sales of amber (B 0.9, 95%CI -5.5; 7.3) and yellow beverages (B 1.3, 95%CI -0.9; 3.5) or the total beverage revenue (B 0.8, 95%CI -12.3; 14.0) was not influenced by implementation of the on-shelf sugar labels.

Conclusion The implementation of an on-shelf sugar labeling system did not significantly decrease unhealthy beverage sales and also did not significantly increase sales of beverages labeled as healthier. Nutritional labeling initiatives combined with complementary strategies, such as pricing strategies or other healthy food nudging approaches, should be considered to promote healthier beverage purchases.

The association between availability and use of physical activity, food, and social services facilities in the residential neighbourhood and obesity among schoolchildren

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Special Interest Group: H. Policies and environments (SIG)

Purpose: Most studies on environmental determinants of childhood obesity have analysed the food or physical activity environment in isolation. However, it is likely that different environmental constructs interact in their relationship with health behaviours and health outcomes. In addition, while assumed by many, it is unclear if the geographical availability of an environmental facility (e.g., fast-food outlet) translates to the use of that facility, and would thus reflect actual exposure. We aim to address these research gaps by investigating how combined measures of availability and use of facilities in the food, physical activity, and social environment are related to overweight among Brazilian schoolchildren.

Methods: In this cross-sectional study 2,026 schoolchildren aged 7-14 years were recruited from a probabilistic sample of public or private schools from a southern Brazilian city. Food environment facilities analysed were snack outlets, grocery stores, and restaurants; physical activity facilities were outdoor recreational facilities such as parks and sports courts; social-assistance facilities included public centres for health care and centres for supplementary education. We conducted multilevel logistic regression analyses with participants clustered within schools. Separate food retailers, all three food retailers combined, and social and physical activity facilities were entered in individual and combined models, which were adjusted for relevant individual (e.g., age, sex, maternal educational) and environmental level covariates (population density, and average area income).

Findings: In fully adjusted models, larger availability of restaurants within 400 metres of schoolchildren's homes was associated with higher odds of overweight (OR=1.40; 95% CI=1.07-1.84) and this association was stronger for those reporting to use restaurants available near the home (OR=1.48; 95% CI=1.15-1.90). Additionally, schoolchildren who had social-assistance facilities surrounding their homes but reported not to use them also showed higher odds of being overweight (OR=1.34; 95% CI=1.01-1.78). The physical activity environment was not found to be associated with obesity.

Conclusions: Availability of food and social environments facilities around the home were significantly associated with about 40% higher levels of overweight in this sample. The use (or not) of facilities was relevant for these associations.

S2.12 - Walkability in the Netherlands: catching up and moving ahead, June 9, 2021

Chair/Discussant: Jeroen Lakerveld, Principal Investigator, Amsterdam UMC

Purpose: To share the first results of Dutch associations and impact of neighbourhood walkability with walking and type 2 diabetes

Rationale: Walkable neighbourhoods can support active living, but is understudied in the Netherlands. The walkability of a neighbourhood refers to the extent to which characteristics of the built environment and land use are conducive to walking. This can be quantified in a walkability index, which in turn can be related to health behaviours and health outcomes in epidemiological research. Recently, environmental data at high resolution and of high quality that is available in the Netherlands was used in the GECCO infrastructure to construct a comprehensive walkability index for several years and several geographic areas. It enabled to address the following objectives: to determine how walkability relates to walking behaviour in the general population, how it explains disease incidence further downstream, and how changes in walkability over time impact on changes in walking over time in older adults. In this symposium we present studies that start to address these questions in the Dutch context, and discuss their outcomes. Summary: The Dutch walkability development will be introduced by the chair. Next, three presenters will zoom into its relation with walking using a large population-based transport study, its association with physical activity and type 2 diabetes incidence, and its longitudinal impact on walking in older adults. Prof. Lawrence Frank will put the contributions into perspective and kicks off a wider discussion with the audience and presenters.

Format

00-05min: Introduction by chair (J. Lakerveld, The Netherlands)

05-20 min: Validation of nationwide walkability index for the Netherlands using transport survey data (T. Lam, The Netherlands)

20-35 min: Neighborhood walkability, physical activity and changes in glycemic markers in people with Type 2 Diabetes: The Hoorn Diabetes Care System Cohort (N. den Braver, The Netherlands)

35-50 min: Longitudinal effects of neighbourhood walkability on walking time in older adults: a fixed effects analysis (E. Timmermans, The Netherlands)

50-60 min: Discussion (Discussant: Prof. L. Frank, USA/CA)

Development and validation of a nationwide walkability index for the Netherlands using transport survey data

Ms. Thao Minh Lam¹, Dr. Zhiyong Wang⁶, Dr. Ilonca Vaartjes^{3,4,5}, Prof. Derek Karssenbergh^{2,4}, Associate Professor Marco Helbich⁶, Dr. Erik J Timmermans¹, Prof. Lawrence D Frank^{7,8}, Prof. Dick Ettema⁶, Dr. Nicolette R den Braver¹, Mr. Alfred Wagtendonk¹, Prof. Joline WJ Beulens¹, Assistant Professor Jeroen Lakerveld^{1,4}

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Special Interest Group: H. Policies and environments (SIG)

Purpose: Neighbourhood walkability indices have been developed and linked to behavioural and health outcomes elsewhere in the world, but not yet for the Netherlands. We aimed to compose a theory-based walkability index for the Netherlands, elucidate its cross-sectional association with adults' walking behaviours and assess how it performed across different strata of demographics.

Methods: The Dutch walkability index consists of seven components: population density, retail- and service destination density, land-use mix, street connectivity, green space, sidewalk density and public transport density. These components were composed and aggregated to three Euclidean buffer sizes (150m, 500m and 1000m) around every postal code or to administrative neighbourhood boundaries. The resulting walkability index, the sum of its componential z-scores, was rescaled to range between 0-100. Data on self-reported demographic characteristics and walking behaviors of adult participants (aged 18-65, n=15,702) were extracted from the Dutch Travel Survey 2017. Using censored regression analysis tobit model adjusted for individual and survey-related confounders (age, sex, race, education level, work status, household income, car possession, household composition, season, urbanization degree, day of the week, survey mode, bike use), we assessed the association between increase in walkability and the following outcomes: total time spent walking, walking for non-discretionary purpose (work- and study-related) and discretionary purpose (e.g., groceries shopping). The main association was also examined across various urbanization degrees, socioeconomic levels, age groups and sexes.

Results: In fully-adjusted models, a 1% increase in walkability was associated with an increase of 0.49 minutes of walking (95%CI: 0.4-0.58), corresponding to 37 meters walked (95%CI: 29-44). This association was consistent across buffer sizes and between discretionary and non-discretionary walking. In terms of components, sidewalk density was most strongly associated with non-discretionary walking, while land use mix was most strongly associated with discretionary walking. Stratified results showed that associations for minutes of walking were stronger in rural (0.90, 95%CI: 0.54-1.26)

compared to highly urbanized areas (0.41, 95%CI 0.23-0.59), for discretionary walking in females (0.53, 95%CI: 0.38-0.67), and non-discretionary walking in males (0.64, 95%CI: 0.44-0.84).

Conclusions: The walkability index was associated with walking behaviours of Dutch adults, indicating its value for further use in the Netherlands.

Neighborhood walkability, physical activity, and changes in glycemic outcomes in people with Type 2 Diabetes: The Hoorn Diabetes Care System Cohort

Dr. Nicole Den Braver^{1,2}, Dr. Femke Rutters¹, Mr. Alfred Wagtendonk^{1,2}, Miss Judith Kok¹, Mr. Peter Harms¹, Prof. Johannes Brug^{3,4}, Dr. Joline Beulens^{1,2,5}, Dr. Jeroen Lakerveld^{1,2,5}

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Special Interest Group: H. Policies and environments (SIG)

Purpose: To investigate the association of neighborhood walkability with change in glycemic outcomes in people with T2D, and whether this association was mediated by physical activity (PA).

Methods: For 1230 people with T2D (68.9 ± 9.0 years old, 63% male) from the Diabetes Care System Cohort, the Netherlands, we objectively assessed the residential walkability within 500m buffers around their house. The walkability index included population density, retail density, land-use mix, street connectivity, sidewalk density and green space surface. As a sensitivity analysis 250 – 1000 m buffers were investigated. A subjective walkability index was constructed based on the Assessing Levels of Physical Activity and fitness (ALPHA) questionnaire. Total PA was device-measured (ActiGraph), and levels of HbA1c and fasting plasma glucose were measured at baseline and 1 year follow-up. Linear regression coefficients (β) with 95% confidence intervals (95%CI) were computed for each outcome, and estimated for the mediating pathway via total PA, adjusted for baseline HbA1c or FPG, follow-up duration, age, sex, education, smoking, car ownership, bike ownership, garden and residential self-selection. Sex was also investigated for effect modification.

Results: Objective and subjective neighborhood walkability were poorly correlated. We observed significant interaction by sex in the association between subjective walkability and HbA1c. No meaningful associations were observed between a unit increase in objective (β : -0.15 mmol/mol (95%CI: -0.59; 0.28)) or subjective (β men: 0.04 mmol/mol, 95%CI: -1.33; 1.41, β women: -1.43 mmol/mol, 95%CI: -3.11; 0.05) walkability and change in HbA1c levels. Similar patterns were observed for glucose. We observed a statistically significant association between higher objective walkability with lower levels of total PA (β : -0.95 h/week, 95%CI: -1.51; -0.38), which was not the case with subjective walkability (β men: -0.12 h/week, 95%CI: -1.79; 1.55, β women: 0.73 h/week, 95%CI: -1.86; 3.31). No associations were found between total PA and glycemic markers (β HbA1c: 0.00 (95%CI: -0.05; 0.05), β FPG: -0.01 (95%CI: -0.01; 0.02)). Sensitivity analyses confirmed the main association.

Conclusions: In this study no meaningful association was observed between walkability with changes in glycemic outcomes in people with T2D. Physical activity was not a mediator in this association.

Associations of changes in neighbourhood walkability with changes in walking activity in older adults: a fixed effects analysis

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Special Interest Group: H. Policies and environments (SIG)

Purpose: Supporting older adults to engage in active lifestyles requires supporting environments. Walkable environments may increase walking activity in older adults, but evidence for this subgroup is scarce, and longitudinal studies are lacking. This study therefore examined whether changes in neighbourhood walkability were associated with changes in walking activity in older adults, and whether this association differed by individual-level characteristics and by contextual conditions beyond the built environment. In particular, the use of a composite exposure measure in a longitudinal environment-physical activity study in older adults is an innovative aspect of this research.

Methods: Data from 668 participants (57.8-93.4 years at baseline) across three waves (2005/06, 2008/09 and 2011/12) of the Longitudinal Aging Study Amsterdam (LASA) were used. These individuals did not relocate during follow-up. Self-reported outdoor walking activity in minutes per week was assessed using the LASA Physical Activity Questionnaire. Composite exposure measures of neighbourhood walkability (range: 0 (low)-100 (high)) within 500-meter Euclidean buffers around each participant's residential address were constructed by combining objectively measured high-resolution Geographic Information System data on population density, density of retail and service destinations, land use mix, street connectivity, green space density, and sidewalk density. Fixed effects linear regression analyses were applied, adjusted for relevant time-varying confounders.

Results: Changes in neighbourhood walkability were not significantly associated with changes in walking activity ($\beta = -0.99$, 95% CI = -6.17-4.20) in older adults. The association of changes in neighbourhood walkability with changes in walking activity did not differ by any of the individual-level characteristics (i.e., age, sex, educational level, cognitive impairment, mobility disability, and season) and area-level characteristics (i.e., road traffic noise, air pollution, and socioeconomic status).

Conclusions: This study did not show evidence for an association between changes in neighbourhood walkability and changes in walking activity in older adults. If neighbourhood walkability and walking activity are causally linked, then changes in neighbourhood walkability between 2005/06 and 2011/12 might have been not substantial enough to produce meaningful changes in walking activity in older adults.

S2.13 - Impact of childcare centre closures due to COVID-19 on pre-schoolers' eating and 24-hour movement behaviors, June 9, 2021

Chair/Discussant: Catherine Draper, Associate Professor, University of the Witwatersrand

Purpose This symposium will showcase international work on how parents perceived the influence of COVID-19 restrictions on their preschool children's eating and 24-hour movement behaviours. The symposium's innovative aspect is the combined focus on behavioural nutrition and movement behaviours.

Rationale Early childhood education and care (ECEC) settings provide opportunities for promoting healthy eating and movement behaviours among children. In many countries the COVID-19 pandemic resulted in closure of ECEC settings to limit spread of disease. This led to more childcare responsibilities for parents at home. Parents and children were affected by restrictions including social distancing and closure of playgrounds leaving limited opportunities for outdoor physical activity. Disruption of children's everyday routines was likely to also affect sleep and eating behaviours. Understanding how COVID-19 restrictions impacted on food intake and movement behaviours of pre-schoolers during closure of childcare settings is important to focus efforts on mitigating detrimental long-term effects on children and parents.

Objectives

1. To provide an international perspective on parental perceptions of the impact of closures of ECEC settings on pre-schoolers' eating and movement behaviours.
2. To discuss prevention strategies including parental support for healthy child development.
3. To combine learning to mitigate the impact of any future pandemic-like events. Summary Catherine Draper (South Africa) will introduce the topic and Joanne Clarke (UK) will present parental perceptions on children's eating and physical activity behaviour. Anthony Okely's presentation (Australia) will focus specifically on the global impact of COVID-19 restrictions on 24-hour movement behaviours. Anne Martin (UK) will present how pre-schoolers outdoor activities changed during the COVID-19 pandemic. Finally, Catherine Draper will engage delegates in a thought-provoking discussion.

Format

5 minutes - Introduction to the topic

40 minutes - Presentations Clarke: Impact of COVID-19 restrictions on preschool children's eating, physical activity and sedentary behaviours: a qualitative study Okely: Global effect of COVID-19 pandemic on physical activity, sedentary behaviour and sleep among 3- to 5-year-old children: a longitudinal study of 14 countries

Martin: Parental perceptions of the impact of social distancing and COVID-19 lockdown on outdoor activities for children aged 2-5 years

15 minutes - Discussion

Interaction Delegates will be encouraged to post their questions in the chat box while talks are being presented. This allows the presenters to respond to specific questions in writing and stimulating questions will be read out by the discussant to kick off the panel discussion. Delegates will also be invited to unmute and ask questions directly.

Impact of COVID-19 restrictions on preschool children's eating, physical activity and sedentary behaviours: a qualitative study

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Special Interest Group: F. Early care and education (SIG)

Purpose: The COVID-19 lockdown placed unprecedented restrictions on the behaviour and movements of the UK population. Citizens were ordered to 'stay at home', only allowed to leave their houses to buy essential supplies, attend medical appointments or to exercise once a day. Children's everyday routines and behaviours were significantly disrupted. This rapid qualitative study explored the impact of lockdown, and its subsequent easing, on young children's food intake, physical activity and sedentary behaviours.

Methods: In July/August 2020, we interviewed 20 parents of children due to start school in September 2020 (aged 3-4 years) by phone or video call. Participants were recruited through nurseries and local Facebook community groups in the South West and West Midlands. Half the sample were from Black, Asian or Minority Ethnic backgrounds, and half lived in the most deprived IMD quintile. Interviews were recorded, transcribed and analysed using thematic analysis.

Results: Parents reported children ate more snacks during lockdown, which was often related to boredom or offering 'treats' to compensate for COVID-19 restrictions. Parents also reported spending more time preparing meals and eating as a family. Most parents noted a substantial reduction in children's physical activity, with this particularly felt by those without access to gardens. Children's screen time increased significantly as parents juggled childcare, jobs and housework, alongside the stress of parenting in a pandemic. Most parents felt changes in snacking, physical activity and screen time were temporary and would have no lasting impact. Others worried about loss of physical skills/stamina and an increased reliance on screens.

Conclusions: During lockdown and its easing, pre-school children increased their snacking and screen time, while decreasing their physical activity. The longer-term impact of this is unknown but parents may need support during future restrictions to maintain healthy family behaviours.

Global effect of COVID-19 pandemic on physical activity, sedentary behaviour and sleep among 3- to 5-year-old children: a longitudinal study of 14 countries

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Special Interest Group: F. Early care and education (SIG)

Purpose: The 2020 COVID-19 pandemic has placed unprecedented restrictions on children's ability to participate in adequate movement behaviours. This international longitudinal study compared young children's physical activity, sedentary behaviour and sleep behaviours before and during the COVID-19 pandemic.

Methods: Parents of children aged 3-5 years, from 14 countries (8 low- and middle-income countries, LMICs) completed surveys to assess changes in physical activity, sedentary behaviour (screen-time) and sleep and how these changes were associated with the COVID-19 pandemic. Surveys were completed in the 12 months up to March 2020 and again between May and June 2020 (at the height of restrictions). PA, sedentary screen time (SST) and sleep were assessed via parent questionnaire. At Time 2, COVID-19 factors including level of restriction, environmental conditions, and parental stress were measured.

Findings: 948 parents completed the survey at both time points. Children from LMICs were more likely to meet the PA (AdjOR=2.0, 95%CI 1.0 to 3.8) and SST (2.2, CI 1.2 to 3.9) guidelines than their high-income country (HIC) counterparts. Children who could go outside during COVID-19 were more likely to meet all WHO recommendations (AdjOR 3.3, CI 1.1 to 9.8) than those who were not. Children of caregivers with higher compared to lower stress were less likely to meet all three guidelines (0.5, CI 0.3 to 0.9).

Conclusions: PA and SST levels of children from LMICs have been less impacted by COVID-19 than in HICs. Ensuring children can access an outdoor space, and supporting caregivers' mental health are important prevention strategies.

Parental perceptions of the impact of social distancing and COVID-19 lockdown on outdoor activities for children aged 2-5 years

Dr. Anne Martin¹, Dr. Avril Johnstone¹, Associate Professor Boris Jidovtseff², Dr. Paul McCrorie¹

¹University of Glasgow, Glasgow, United Kingdom, ²University of Liege, Liege, Belgium

Special Interest Group: F. Early care and education (SIG)

Purpose: Due to the COVID-19 pandemic, between March-August 2020 Scottish early years settings were closed except to children whose parents were key workers and vulnerable children. There were restrictions on outdoor activities with playgrounds closed, and social contact among households was forbidden. Some restrictions eased in July 2020. This study aimed to explore parental perceptions of COVID-19 restrictions on children's outdoor activities.

Methods: Parents (n=205) completed an online survey on outdoor play, of which 77 parents (61 female, 16 male) of children aged 2-5 years (3.9 ± 1.0 years) provided free-text entries on the impact of COVID-19 on outdoor activities for their child. Data were analysed deductively based on pre-defined codes relating to the three concepts of the Individual and Family Self-Management Theory: Context (condition, physical/social environment, individual/family factors); Process (Knowledge/beliefs, self-regulation, social facilitation); Outcomes (proximal, distal). Frequencies were calculated on responses to closed questions on COVID-19 restrictions on children's play habits.

Results: Of the full sample, 139 (68%) indicated that COVID-19 restrictions changed their children's play habits. Of those, 83 (60%) suggested that children played more often outdoors and 121 (87%) indicated that children played less with friends. Qualitative data confirmed that children spent less time playing outdoors and interacting with peers but suggested that children spent more time outdoors exploring the local area as a family in form of walks and cycles. More outdoor time led to opportunities for children to learn new skills (e.g., bike riding) and some developed a preference for outdoor activities over use of electronic devices. The closure of playgrounds was upsetting for children and some lost confidence at using swings after playgrounds reopened. While some parents felt that social distancing resulted in children becoming shy around other children and adults for some time, other parents observed improved outdoor play with other children when allowed to be with peers again.

Conclusions: COVID-19 restrictions limited play opportunities for children. Parents self-managed this challenge by exposing their children to experiencing the local outdoor environment as a family. The long-term impact of the restrictions on sustained outdoor activities and child development remains to be investigated.

S2.14 - The effects of recreational football for health in older adults: is it safe, does it improve functional movement and does it enhance well-being?

June 9, 2021

Chair: Michael Duncan, Professor in Applied Sport And Exercise Science, Coventry University

Discussant: Tapani Risto, Senior Lecturer, Univ. of Applied Sciences LAUREA

Purpose: The concept of football as medicine is established in the literature with good examples of the use of football for physical activity and health benefit in different populations (Krustrup and Parnell, 2019). In the context of ageing, walking football for older adult groups has gained popularity due to the perception that it is safer than regular football. However, recreational football, where running is permitted, has been suggested as safe and more effective than its walking equivalent for older adults to undertake (Krustrup et al. 2018). However, evidence is lacking regarding these claims. Without scrutiny of the effects of recreational football in older adults, practitioners and policy makers are unable to make decisions relating to its use in community settings. This symposium will address this issue, bringing together perspectives and data from the pan-European, Erasmus+ Sport 6-0! Recreational football for health programme.

Objectives: · To determine if recreational football for health is safe for older adults to undertake. · To explore the effects of recreational football on functional movement in older adults. · To unpack, qualitatively, older adults lived experiences of recreational football for health. · To cocreate, with delegates, key considerations for using recreational football for healthy active ageing. Summary: This session will define the concept of recreational football for health and determine the safety of this form of football for older adults by presenting data from separate cohorts in four different countries. This will be followed by an examination of the effects of recreational football for health on older adults' functional movement, a key correlate of independent living for this sector of the population. The third part of this symposium will unpack the experiences of older adults involved using perspectives from focus group interviews. Format: · Michael J. Duncan: Introducing the concept of recreational football for older adult health (4min) · Michael J. Duncan: Is recreational football safe for older adults to undertake? (12min) · Tapani Risto: Recreational football for community dwelling older adults to support physical fitness and functioning (12min) · Sophie Mowle: "Football- it's in your blood" – Lived experiences of undertaking recreational football for health in older adults (12min) · All: Interactive polls will be employed in between each presentation to gauge delegate opinion and build towards interactive discussion post presentation where delegates and speakers will cocreate a list of considerations to carry forward in evolving research and practice for the use of recreational football for older adult health.

Is recreational football safe for older adults? Injury prevalence during a 12-week intervention in four European countries

Prof Michael Duncan¹, Miss Sophie Mowle¹, Dr. Morten Randers², Dr. Alain Belli³, Dr. Mikko Julin⁴

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Special Interest Group: A. Ageing (SIG)

Purpose: Data examining whether recreational football is safe for older adults to undertake is current not available and there are questions as to whether recreational football is safe for older adults to undertake. This study addresses this issue by determine the incidence of injury during a pan-European recreational football for health intervention undertaken by adults aged 60-80 years.

Methods: Community dwelling older adults, aged 60-80 years (n=74, 19 females, 55 males) undertook a 12-week, twice-weekly, recreational football for health programme in four different countries (UK, Denmark, France, Finland). Injuries were recorded after every session in terms of nature, severity and how the injury occurred. Injury severity was recorded using the FIFA consensus statement on injury recording. Data are presented as number of injuries per hour, exposure risk hours and injury numbers per 1000 hours.

Results: Irrespective of country, injury incidence during recreational football for health in older adults is classified as low with injury rates between 2.3-0.5 per 1000 hours per participant. Higher injury rates were observed on macadam playing surfaces (.03 injuries per hour of play) compared to artificial turf (.014 injuries per hour of play) or indoor wooden floor (.017 injuries per hour of play).

Conclusions: The data presented here are the first to explore injury prevalence resulting from recreational football in older adults and should be seen as an initial exploration of the topic, based on data collected in community football programmes in four countries. These initial findings suggest that injury prevalence is low in supervised, recreational football in older adults. Such information establishes that this form of physical activity is safe for older adults to undertake and is a key needed step for community physical activity providers and practitioners wishing to use football related programmes to enhance older adult health.

Recreational football for community dwelling older adults to support physical fitness and functioning

Mr Tapani Risto, Dr. Mikko Julin

¹LAUREA univ. of applied sciences, Espoo, Finland

Special Interest Group: A. Ageing (SIG)

Purpose: Recreational football training is described as all-in-one training with broad spectrum health and fitness effects. It covers high intensity aerobic, endurance, agility, and strength training modes. This study assessed whether simple and feasible walk tests could detect fitness changes in a group of 60+ years participants who played recreational football for 12 weeks.

Methods: Community dwelling older adults, aged 60-76 years (n=22, 8 females, 14 males) took part to a 12-week recreational football intervention in Finland. Training was organized twice a week for an hour per session. Recreational football session consisted a thorough warm-up, football skill session and small-sided games. Games encountered half of time in the training sessions. Prior and after the training intervention, 6-minute walk test (6MWT), 10-meter walk test (10MWT) and 8-foot timed-up-and-go (TUG) test were conducted to assess the effects of recreational football on participant's fitness and functioning.

Results: The mean attendance was 19,6/24 (81,6%) times. Endurance measured with 6MWT, improved significantly 30,4m (631,8m to 662,2m; sig .001). Walking speed monitored by 10MWT decreased significantly 0,2s (4,3s to 4,1s; sig .043). Agility measure TUG showed significant improvement in average 0,7s (4,4s to 3,8s; sig .000). A small control group (n=10, 1 female, 9 males) showed no improvements on these tests during the same time period.

Conclusions: This data from Finnish community dwelling older adults playing recreational football is derived from multinational EU Erasmus+ Sport funded project. These results are very much in line with the data and experiences from the other participant countries (UK, Denmark, France, Spain). These findings support the idea that recreational football is all-in-one training that can enhance physical fitness and functioning of the older adults. Unlike many other sports prescribed to older adults (e.g. walking or swimming), football can be intensive activity. Activities with intensity are needed to maintain good functioning and healthy aging. It can be concluded that recreational football is adjustable, variable, social, and fun for participants of all skill levels.

“Football- it’s in your blood” – Lived experiences of undertaking recreational football for health in adults aged over 60

Miss Sophie Mowle¹, Dr. Mark Noon¹, Dr. Emma Eyre¹, Dr. Jason Tallis¹, Prof Michael Duncan¹

¹Coventry University, Coventry, United Kingdom

Special Interest Group: A. Ageing (SIG)

Purpose: Physical inactivity is prevalent in older adults and contributes to age-related decline in function, health, wellbeing and quality of life. Strategies to promote physical activity in this population are essential to improve health outcomes and offset the economic burden associated with an ageing population. Recreational football for older adults has shown promise for promoting health benefits. The physiological benefits of recreational football are well documented in the literature. However, no studies have looked at the experiences of those who take part in it. While understanding the physical demands of recreational football, which is more dynamic than say, walking football is important, it is more essential to understand how participants experience this activity to better direct providers planning to run recreational football in older adults.

Methods: This novel study utilises the Behaviour Change Wheel and COM-B model to discover older adult recreational footballers' lived experiences and find which behaviours can encourage changes to sedentary lifestyles in this population. Fourteen participants (67±5.1 years), who had previously taken part in a recreational football intervention, shared their perceptions from participating in a recreational football programme during two focus groups. Transcripts were thematically analysed, looking for incidences of the COM-B model. The participants' responses were grouped into three cluster themes which were then organised into sub-themes of capability, opportunity, and motivation.

Results: The main finding from this study was that the barriers around physical opportunity need to be addressed to increase physical activity in older adults but, arguably of greater importance to maintain adherence to a physically active lifestyle, there must be an opportunity for reflective motivation and the chance for social opportunity.

Conclusions: The use of the Behaviour Change Wheel in the present study, to identify the capability, opportunity, and motivation for playing recreational football, is a unique feature, which is crucial in enabling public health practitioners, community sport and local government providers to construct effective interventions to increase physical activity in an older adult population. Identifying the importance of physical opportunity, reflective motivation, and social opportunity are significant when it comes to looking at the sustainability of recreational football for health.

**O2.20 - Determinants of health behaviors in early childhood,
June 9, 2021**

Family socio-ecological correlates of lifestyle patterns in early childhood: a cross-sectional study from the EDEN mother-child cohort

Mrs. Alexandra Descarpentrie¹, Dr. Cécilia Saldanha-Gomes¹, Miss Claire Guivarch¹, Dr. Patricia Dargent-Molina¹, Dr. Blandine de Lauzon-Guillain¹, Dr. Sabine Plancoulaine¹, Dr. Marie-Aline Charles^{1,2}, Dr. Airu Chia³, Assistant Professor Mary Chong^{3,4}, Dr. Stephanie Vandentorren⁵, Dr. Barbara Heude¹, Dr. Jonathan Bernard^{1,4}, Dr. Sandrine Lioret¹
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Special Interest Group: G. Children and families (SIG)

Purpose: The co-occurrence of energy balance-related behaviors (EBRBs) into the so-called lifestyle patterns could play a synergistic effect on the development of adiposity. However, few studies have considered sleep as part of these lifestyle patterns, nor have examined their contextual correlates. This study aimed to identify patterns of diet, screen viewing, outdoor play, walking, and sleep, in preschool girls and boys separately, and to explore their family socio-ecological correlates.

Methods: We used cross-sectional data collected by parental questionnaires of 978 5-year-old children participating in the EDEN cohort. We assessed contextual factors and organized them in three different socio-ecological levels: family (e.g socio-demographics), parents (e.g health and EBRBs), parent-child interactions (e.g routines around EBRBs). We also assessed children's dietary intake, screen, outdoor play, walking, and sleep times and applied a principal component analysis to identify sex-specific lifestyle patterns. In light of our three-block socio-ecological model, hierarchical linear regressions were undertaken to explore the cross-sectional relations between contextual factors and the patterns identified.

Results: Three types of lifestyle patterns were observed, with slight nuances between sexes: unhealthy, healthy and mixed. The unhealthy and mixed patterns were characterized, among other behaviours, by low or high sleep time. Focusing on the healthy pattern, labelled "High fish, dairy products, fruit and vegetables, low screen", children whose mothers adhered to a healthy diet and whose parents scored higher on the home stimulation score had higher scores on this pattern. Among boys, higher scores were observed for those born to non-working mothers compared to full-time working mothers (β [95% CI]=0.30 [0.00;0.60]). Adherence to this pattern was also lower in boys with a later bedtime (-0.36 [-0.54;-0.17]). Among girls, adherence was lower when the mother presented more depression symptoms.

Conclusions: Our findings confirm that EBRBs, including sleep, combine in different lifestyle patterns in early childhood. They further suggest that time constraints experienced by working mothers; the provision of social support to mothers experiencing mental health issues; and the engagement with parents to promote healthy lifestyles for themselves and their children, are worth considering in the development of multi-behavioural obesity prevention interventions programs.

Associations between home environment factors and consumption of healthy and unhealthy foods and beverages among preschoolers in Finland

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Special Interest Group: G. Children and families (SIG)

Purpose: Dietary habits are formed in early childhood and can persist into adulthood. The home environment plays an important role in shaping the diet of children. The aim of this study was to, by using the socioecological model modified for DAGIS-research project, explore associations between social and physical home environment factors and Finnish preschool children's consumption of vegetables, fruits, berries (FV), and sugary foods and beverages (SFB).

Methods: A cross-sectional study was conducted between 2015–2016. Guardians (N=819) of children aged 3–6 completed a food frequency questionnaire measuring the frequency of FV and SFB consumed by the child during the past week, and a questionnaire measuring the social and physical environment at home (N=809). Adjusted analyses were conducted using multiple (backward-method) linear regressions.

Results: In the final adjusted model for FV, predictors positively associated with child's consumption of FV were: parents modelling of eating FV (standardized regression coefficient (β) being 0.286, $p < 0.001$); satisfaction with the amount of FV in child's diet ($\beta = 0.150$, $p < 0.001$); perceived norms of adequate amount of FV in child's diet ($\beta = 0.098$, $p = 0.005$); parent's opinion that serving children enough FV is important (0.094, $p = 0.010$); offering FV as a snack ($\beta = 0.131$, $p = 0.001$) and number of different types of FV at home ($\beta = 0.142$, $p < 0.001$). In the final adjusted model for SFB, predictors positively associated with child's SFB consumption were: giving the child some other food if he/she does not like what is offered ($\beta = 0.074$, $p = 0.021$); norms of acceptable amount of SFB in child's diet ($\beta = 0.374$, $p < 0.001$) and the availability of SFB at home ($\beta = 0.144$, $p = 0.001$). Satisfaction with the amount of SFB in child's diet was negatively associated with child's consumption of SFB ($\beta = -0.146$, $p < 0.001$). The models explained 40% and 29% of the total variance in children's FV and SFB consumption respectively.

Conclusions: Parents' norms and attitudes, and availability of foods at home are important in shaping the diet of preschool aged children. However, besides availability it is important that parents model FV eating for children and offer children FV to increase the frequency of FV consumption.

Correlates of sleep disturbances in children aged 0-8 years old: parent, child and environment characteristics

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Special Interest Group: G. Children and families (SIG)

Objectives: Sleep is important for healthy child development; however, sleep disturbances are common across childhood. This study aims to identify the parental, child and environmental correlates of sleep disturbances in early childhood; and examine the moderating effects of sociodemographic factors.

Methods: Longitudinal data of 700 children aged 0-8 years, gathered in the CIKEO cohort-study in the Netherlands were analyzed. Sleep disturbances were defined as the presence of night awakenings ≥ 3 times per night or sleep-onset latency of > 30 minutes. Multivariable logistic regression was used to identify correlates of sleep disturbances in children.

Results: The mean age of the children was 3.2 ± 1.9 years at baseline and 4.4 ± 1.8 years at follow-up; 47.3% were girls. The presence of sleep disturbances was 13.3% and 15.4% at the baseline and follow-up, respectively. The incidence and persistence rates of sleep disturbances at follow up were 12.0 % and 37.6 %, respectively. Being a girl (OR [95%CI] = 1.77[1.06,2.97]), being the first parity (OR [95%CI] = 1.84 [1.05,3.23]), having a younger age (OR [95%CI] = 0.85[0.72,1.00]), and previously being diagnosed with any diseases (OR [95%CI] = 3.18 [1.18,8.55]) was associated with the incidence of sleep disturbances in children. Higher parenting self-efficacy was a protective factor for sleep disturbances in children (OR [95%CI] = 0.94 [0.88,1.00]). Children that experienced one (OR [95%CI] = 2.66[1.26, 5.65]) or more (OR [95%CI] = 2.50[1.10,5.68]) stressful life events had a higher risk of sleep disturbances at follow up.

Conclusions: In this sample, several parental (i.e., parity, parenting self-efficacy), child (i.e., age, gender, previous diagnosis of any diseases) and environmental (i.e., stressful life events) correlates of sleep disturbances in children were identified. Further research is warranted to verify our findings and to unravel possible pathways and interactions underlying these associations. Parents, preventive interventions and policies should adequately address the specific and ongoing needs of these particular subgroups of children and realize sufficient reach among these children using insights on prevention of sleep disturbances.

Keywords: Child, Sleep disturbances, Night awakenings, Sleep latency, Correlates

Parental mental well-being and adult-child nature visit frequency; parental perceived barriers mediating the association?

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Special Interest Group: G. Children and families (SIG)

Purpose: Regular visits and interacting with nature have been shown to provide numerous health benefits for adults and children. Children's possibility to engage with and being physically active in nature depends to some degree on whether parents spend time with them out in nature. Parental mental health has been linked with children's physical activity levels. No prior studies have examined whether parental mental well-being is related to children's nature visit frequency. Nature visits have also been associated with the degree of barriers that parents perceive. The aim was to examine the association between parental mental well-being and adult-child nature visit frequency, and whether this association is mediated by parental perceived barriers.

Methods: An online cross-sectional survey was conducted in Finland in spring 2019. Parents (N = 1463) of children aged 2-7 answered the questionnaire. Parental mental well-being was measured by the Short Warwick Edinburgh Mental Well-Being Scale (SWEMWBS), and 12 perceived barriers for visiting nature with their child were explored. Adult-child nature visit frequency during the previous month was asked on a scale from not once to 5 times/week or more. Process Macro version 3.5 for SPSS was used to test the hypothetical mediation model with bias-corrected bootstrapped 95% CI.

Results: In the multiple mediation model, a direct positive association was found between parental mental well-being and adult-child nature visit frequency, unstandardized regression coefficient (B) being 0.02 (95% CI: 0.00, 0.04), N=1377. There was also an indirect effect of parental mental well-being on nature visit frequency through "Lack of competence and logistics" (B=0.02, 95% CI: 0.01, 0.02) and "Lack of time and interest" (B=0.02, 95% CI: 0.02, 0.03), but not through "Insecurity and fear" (B=-0.00, 95% CI: -0.00, 0.00). The model explained 19% of the variance in adult-child nature visit frequency (total effect B=0.06, 95% CI: 0.04, 0.08).

Conclusions: This study was the first to study whether parental mental well-being is related to adult-child nature visit frequency. Better parental mental well-being was associated with more frequent adult-child nature visits, and this relationship was partially mediated by perceived barriers. Further studies are needed to confirm the explored findings.

Are parental perceptions of risk associated with the frequency of children's outdoor play: an exploratory analysis of Scottish parents with children aged 2-5 years old

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Special Interest Group: F. Early care and education (SIG)

Purpose: Young children's engagement in outdoor play is an important contributor to their physical activity (PA) levels. However, parent's perceptions of risk in outdoor play may limit children's opportunities to engage in this health enhancing type of PA. We know little of the importance of parental perceptions of risk from a Scottish context, yet a greater understanding may offer insight for targeted intervention to ensure young children are exposed to developmentally beneficial play opportunities. This paper explores this relationship in a sample of Scottish parents of children aged 2-5 years old.

Methods: Parents (n=205, 87% female) of children aged 2-5 years old (mean=3.7 ±1.03) were recruited through social media and national parent and early years networks to complete an online survey exploring perceptions of risk in 10 different outdoor play situations (including height, water, speed, and sharp objects). Each pictorial scenario had parents responding with their level of agreement of the risk associated with the activity. Aggregated scores across scenarios represented parent's overall perception of risk (0 = least risky – 10 = most risky). Outcome variable was a four-level ordered response ('Once a week or less' '2-3 times a week', 'Once a day' and 'more than once a day') representing the frequency parents took their children outdoors to play. Analysis was ordered logistic regression, adjusting for child age, parent education, scenario benefits, child's physical ability, and parent's childhood risk experience.

Results: Mean number of risky scenarios was 3.3 (±2.16, range 0-10). Overall benefits (r=-0.45), child's physical ability (r=-0.39), and parent's childhood risk experience (r=-0.17) were all negatively associated (p<0.01) with perception of risk. All parents would permit their child to engage in each scenario, the majority conditional (e.g., 82% of scenarios stipulated adult supervision). No significant relationship was found between risk and the frequency of outdoor play (proportional OR=1.00; 95%CI=0.88,1.15).

Conclusions: Parental perceptions of risk may not influence the likelihood of young children engaging in outdoor play; potentially reflecting the adult supervision over these activities. It remains important to educate parents about the benefits of outdoor play to reduce the perceived risk associated with these activities.

Promoting physical activity in children and childcare staff: One-year follow-up

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Special Interest Group: F. Early care and education (SIG)

Purpose: Systematic reviews have demonstrated that physical activity interventions in childcare settings are effective. However, as many studies do not collect follow-up information, the sustainability of physical activity changes remains unclear. This study aims to explore changes in children's and staff's moderate-to-vigorous physical activity (MVPA) after a 12-month quality development process and at one-year follow-up.

Methods: Eight childcare centers in a rural region in Bavaria, Germany, enrolled in the study. Staff from all childcare centers took part in five workshops (kickoff, goal setting, participation of children and parents, reflection and exchange, presentation of results) that were accompanied by tasks for the team of each childcare center (use a self-evaluation-app to assess PA environments and practices, set three center-specific goals targeting PA based on the results of the app, implement center-specific actions, use Goal Attainment Scaling to track the success at implementation). Changes in PA environments, policies and practices were documented by the childcare staff. Changes in children's and staff's MVPA were evaluated in a quasi-experimental study with a one group pretest-post-test design. MVPA (minutes per day) was measured at baseline, post-intervention and one-year follow-up using ActiGraph GT3x+ accelerometers.

Results: The implemented and documented actions mainly targeted activities offered, e.g., daily structured staff-led activities (n = 9), and parental work, e.g., workshops with parents (n = 8). 55 children (41.8 % male) and 22 childcare workers completed the one-year follow-up. Children's mean MVPA increased from 34.55 min/day (SD = 22.30) at baseline to 41.12 min/day (SD = 25.57) post-intervention and 54.94 min/day (SD = 31.85) at one-year follow-up. A repeated-measures analysis of variance showed statistically significant effects of time on children's MVPA ($F [2, 108] = 26.550$; $p < 0.001$; $\eta^2 = 0.330$). Staff's MVPA levels showed a small but not significant increase over time (baseline: 51.35 min/day, post-intervention: 57.62 min/day, one-year follow-up: 64.08 min/day).

Conclusions: These findings suggest that the quality development process may be a sustainable way to promote children's and childcare staff's physical activity.

**O2.21 - Motivational predictors of behavior change before and after
COVID-19,
June 9, 2021**

Generic health literacy and health behavior outcomes in adolescents. Results from the cross-sectional survey “Health Literacy among Adolescents” in Germany (GeKoJu)

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Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: Generic health literacy (GHL) entails knowledge, motivation and competencies to find, understand, assess or apply health information and is considered as a determinant of health. Data on adolescents' GHL are still lacking. The study examines to what extent different dimensions of GHL are associated with health behavior-related outcomes in adolescence. This was feasible as the novel “Measurement of Health Literacy Among Adolescents-Questionnaire” (MOHLAA-Q) had recently been developed.

Methods: We conducted a representative nationwide cross-sectional online survey among 14–17-year-olds living in Germany (GeKoJu). Self-reported GHL was measured with the MOHLAA-Q, which addresses cognitive, behavioral and motivational dimensions of GHL. We collected data on relevant health behaviors during adolescence: sports, consumption of fruit and vegetables, smoking, and alcohol consumption. Bivariate and multiple logistic regression analyses were used with a sample size of $n=1,190$. The associations were adjusted for socio-demographic factors (age, sex, educational level, migration background, family affluence) and generic self-efficacy.

Results: Adolescents with low levels in the cognitive-behavioral dimension of GHL report less often to do sport (74.8% vs. 83.8%) or to consume fruit and vegetables daily (15.7% vs. 27.0%). Even after adjustment for other factors, these lower health literacy levels are associated with a higher chance of not eating fruit and vegetables daily ($OR=1.58$; 95%- $CI=1.10-2.27$). Poor levels in the motivational dimension of GHL are associated more strongly with health behavior-related outcomes (e.g. $OR=3.06$; 95%- $CI=2.23-4.20$ for not eating fruit and vegetable) than the cognitive-behavioral dimension. With regard to risky alcohol consumption, however, no associations with any dimensions of GHL were observed. Considering self-efficacy in the models attenuates the strength of associations between GHL and the examined health behavior.

Conclusions: GHL is associated with daily fruit and vegetable consumption and physical activity by sports. Supporting motivational and cognitive-behavioral dimensions of GHL and strengthening self-efficacy could therefore be a starting point for promoting a balanced diet and sufficient physical activity in adolescence.

Relationships between motivation and dietary and physical activity behaviours in secondary vocational students

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Special Interest Group: B. Motivation and behavior change (SIG)

Background: Unhealthy eating habits and lack of physical activity are major problems in adolescents and young adults. These unhealthy behaviours may lead to a higher risk of noncommunicable diseases and sick leave in later life. In order to develop effective healthy lifestyle intervention programmes, more research is needed to identify factors that predict the engagement in health behaviours among this population. In the present study the Self-Determination Theory (SDT) is used to examine the association between type of motivation and dietary and physical activity behaviours in secondary vocational students.

Methods: This cross-sectional study included 809 students (mean age 17.8 ± 1.9 years) attending secondary vocational education in a metropolitan area of the Netherlands. The self-administered online questionnaire included questions on socio-demographic factors, dietary behaviours, physical activity behaviours, and self-regulation for regular exercise and eating a healthy diet (by means of the Treatment Self-Regulation Questionnaire (TSRQ)). TSRQ scores were used to distinguish different types of motivation: amotivation, controlled motivation, and autonomous motivation. Linear multilevel regression analyses, adjusting for age, gender, weight status and educational training level, were used to investigate the association between type of motivation and dietary and physical activity behaviours.

Results: For dietary behaviours, a negative association between autonomous motivation and portions of high-calorie snacks can be seen. Autonomous motivation showed a positive association with the amount of fruit and water intake per day and breakfast frequency. Controlled motivation showed no significant associations with any of the dietary variables. Amotivation showed a positive associations with portions of high-calorie snacks per week and with diet soda consumption, while a negative association was found with breakfast frequency. For physical activity behaviours, autonomous motivation was positively associated with moderate-to-vigorous physical activity. No other significant associations between type of motivation and physical activity behaviours were found.

Conclusions: In general, dietary and physical activity behaviours of secondary vocational students are poor. Type of motivation according to SDT seems to partly explain dietary and physical activity behaviours in secondary vocational education students. Autonomous motivation in particular was shown to be associated with healthy behaviours and could therefore be a valuable intervention target.

The effects of a Play Lü inter-team competition exergame on adolescents' moderate-to-vigorous physical activity and situational interest

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Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: Experimental results have suggested that exergames involving inter-team competition may elicit greater psychosocial and physiological benefits than single-player exergames (Moss et al., 2018). However, few exergames allow two teams of players to compete against each other in the same session (Mackintosh et al., 2016). Furthermore, no study has compared an exergame session and a control condition using both an inter-team competition mode. As a new exergame platform, Play Lü (Lü Interactive Playground, Québec, Canada) is primarily centred on a multiplayer mode allowing up to six players simultaneously engaged in a same session. This study estimated the effects of an inter-team competition exergame condition (Play Lü) on adolescents' moderate-to-vigorous physical activity (MVPA) and situational interest (SI) compared to an inter-team competition control condition.

Methods: One hundred and twenty-eight adolescents (69 girls; Mage = 13.9; SD = 1.2) completed two 15-min inter-team competition sessions (two teams of three players) using a counterbalanced measures design. They practiced a Play Lü session including Dojo, Pila and Scala games, and a control session using a tic-tac-toe throwing game. Their PA was assessed by ActiGraph accelerometers and their SI via a validated scale immediately after each session.

Results: Repeated measures MANOVA revealed higher scores for adolescents' MVPA (67.19% vs. 48.62%, $p < .01$), triggering-SI (3.88 vs. 2.99, $p < .01$), maintained-SI feeling (3.67 vs. 2.59, $p < .01$) and maintained-SI value (3.62 vs. 2.18, $p < .01$) during the Play Lü session compared to the tic-tac-toe control session.

Conclusions: This study showed that an inter-team competition exergame using Play Lü might be a good option to enhance adolescents' PA and SI. The Play Lü platform offers opportunities for exergame researchers to design and test multiplayer sessions manipulating the cooperation and competition elements.

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Using the COM-B model of Behaviour Change to Understand Participation in Sport and Physical Activity in Ireland during COVID-19

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Special Interest Group: B. Motivation and behavior change (SIG)

Aim: Use 2019 Irish Sports Monitor (ISM) data on determinants of Physical Activity behaviours to develop theories that explain the rise and fall of participation levels across different sports during COVID-19.

Methods: In 2019, Sport Ireland used a flexi module of the ISM to undertake research with approximately 1,400 people to better understand PA behaviours in Ireland as they relate to the COM-B model of Behaviour Change. 12 questions were asked on the module- 4 each on capability, opportunity and, motivation.

In 2020, a survey of over 7,400 respondents was undertaken between February and September to provide insights into sports participation and recreational walking trends throughout Covid-19.

Results: The 2020 Covid-19 research reported a significant increase in physical activity levels. At the peak of the pandemic restrictions in Ireland, 7% of the population, approximately 255,000 people, who were previously inactive, started walking or taking part in sport.

COVID-19 and the associated restrictions had limited impact on population capability levels. Capability takes time to build or diminish and some of the behavioural changes we found occurred almost instantly and at scale, indicating that levels of physical and psychological capability were not primary factors in reducing population inactivity.

The impact COVID-19 has had on opportunity could largely explain the fall in participation levels of facility based and team based sports. This is off set by the stay at home phase which resulted in large parts of the population having more free time, a dimension of physical opportunity. However, something additional must have inspired 255,000 previously inactive people to use this free time to start walking or taking part in sport- motivation.

The 2019 ISM study found that motivation is the COM-B domain most predictive of physical activity levels. Having a routine and setting a goal that supported physical activity showed the most significant correlation to people's physical activity levels. This may indicate that high levels of reflective motivation were triggered within the population as the pandemic hit. The changes in reflective motivation combined with increased time can explain the significant reductions in population inactivity.

Conclusion: These findings suggest that we need to improve our understanding of the dimensions of reflective and automatic motivation, beginning with the promotion and establishment of sport and physical activity goals and routines at population levels to drive up sports participation.

Physical activity and sedentary behaviours of adults during the COVID-19 lockdown in France

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Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: During the Covid-19 lockdown, Sant   publique France launched a behavioural surveillance system (CoviPrev survey) to assess the impact of lockdown on the health behaviours of the population. One wave of this survey, conducted from May 4 to 6, 2020, studied the levels of physical activity (PA) and sedentary behaviour (SB) of French adults and the change in these behaviours compared to before lockdown.

Methods: An independent sample of 2,000 adults, living in metropolitan France, was interviewed online. Representativeness was ensured by quota sampling and data were adjusted according to the 2016 population census. The prevalence of insufficient PA (<30 min/day), noteworthy SB (sitting time >7 hours/day) and the frequency of sitting time breaks were assessed and analysed, as well as their associations with sociodemographic and mental health variables. Reported changes in PA and sitting time compared to before lockdown were analysed using multivariate models.

Results: During the lockdown, half of the population had insufficient PA and one-third reported a high level of SB. The majority (55%) did not break their sitting time at the recommended frequencies. Compared to before lockdown, 47% of adults reported that they decreased their PA and 61% they increased their daily sitting time. Insufficient PA concerned more people in lower socio-professional categories or with no professional activity, as well as women with fewer qualifications, work stoppage or partially unemployment. A reported decrease in PA was associated with high social status and, among men, teleworking. The reported increase in sitting time was associated with teleworking and short-time working. Insufficient PA, noteworthy SB, decreased PA and increased sitting time compared to before lockdown were associated, differently by gender, with anxiety, depression or sleep disorders.

Conclusions: This study shows a decline of PA and an increase of SB in French adults during the COVID-19 lockdown. It highlights the importance of promoting an active lifestyle in such a situation, in order to maintain the physical and mental health of the population. Preventive measures to limit sedentary behaviours also appear particularly important in the context of telework, which is likely to develop beyond the Covid-19 pandemic.

Fitness professional's motivation, motivational practices used and burnout signs during the first COVID-19 social confinement: A qualitative study

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Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: The COVID-19 pandemic has profoundly altered people's daily lives, in particular, their physical activity patterns. Lockdowns precluded access to gym facilities with potential severe consequences for the fitness context and its workers.

This work sought to examine the impact of first COVID-19 lockdown (March->May, 2020) on fitness professionals work-related motivation, motivational strategies used, levels of engagement and burnout signs motivational, and their perceptions concerning their professional future.

Methods: A qualitative study, using the framework of Self-Determination Theory (looking at work-related motivation, motivational strategies used, levels of engagement and burnout signs,) was carried out through a focus group approach. Transcripts were analyzed using inductive content analysis (MAXQDA). Data was collected from 24 Portuguese fitness club managers, personal trainers and group trainers (three focus Groups).

Results: Several main categories emerged from transcripts content analysis :1) the need to comply with social confinement rules, driven by the desire to overcome the pandemic risks and return to professional daily routines; 2) autonomous motivation, driven by passion, challenge and the need to inspire; 3) internal and external pressures had a negative impact on work-related motivation; 4) burnout symptoms were expressed related to uncertainty regarding the future and constraints on their practice (e.g digital classes); 5) motivational strategies included increased levels of choice, opportunities to innovate and adapt, aiming at providing appropriate prescription and interaction, using, for example, online tools. Furthermore, the professionals referred to how these topics would negatively affect their work with clients and the promotion of their exercise behaviors.

Conclusions: This study identified constraints in motivation to work and strategies used in fitness professionals in response to the first COVID-19 related social confinement. Despite the experienced pressures, there was an effort to provide adequate need-supportive strategies to their clients during digital classes. Nonetheless, burnout signs warrant further attention as they can compromise not only mental health and professional practices of the professionals itself, but also the much-needed exercise promotion with their clients.

**O2.22 - Food environments: Social and physical influences,
June 9, 2021**

The influences of the community and consumer nutrition environment on the food purchases and dietary behaviours of adolescents: a systematic review

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Special Interest Group: H. Policies and environments (SIG)

Purpose: Adolescence is a period of increased autonomy over decision making, including food choices, and increased exposure to factors outside the home. Combining these factors means the physical food environment could play an important role in adolescents' independent food purchasing and dietary behaviours. This review aimed to understand how community and consumer nutrition environment exposures were associated with adolescent food purchasing and dietary behaviours.

Methods: Six databases were searched using MESH and free-text terms. Titles and abstracts were screened by one reviewer. If eligible, two reviewers performed data extraction and assessed each article for risk of bias in relation to the research questions using predefined criteria. As meta-analyses were not possible, Cochrane recommendations were followed to synthesise results using a vote counting technique and effect direction plots which recorded the direction of the effect in relation to the expected relationship with health.

Results/findings: The search yielded 4,826 articles; 32 observational and no intervention studies met the inclusion criteria. Two studies were classified as having a high risk of bias, 23 as moderate risk, and seven as low risk of bias. In the twelve studies that assessed adolescent exposure to healthy community nutrition environments, results did not show clear associations with dietary outcomes. None of these studies considered food purchasing as an outcome. Twenty-eight studies assessed adolescents' exposure to unhealthy community nutrition environments with the majority (n=17/28, 61%) reporting results in the expected direction suggesting greater exposure to food outlets classified as unhealthy was associated with poorer food purchases and dietary intakes. Inconsistent results were observed across the five studies investigating associations between the consumer nutrition environment and adolescent dietary behaviours. No studies investigated associations between the consumer nutrition environment and food purchasing.

Conclusions: Evidence suggests increased exposure to unhealthy food outlets is associated with increased purchasing and consumption of less healthy food in adolescents. There is limited research describing associations between exposure to healthy food outlets, the consumer nutrition environment, and independent adolescent food-related

behaviours, particularly adolescent food purchasing. Further research in these areas may help to identify interventions and policy strategies to improve the diets of adolescent populations.

Exploring the complex relationship between adolescents' social environments and their use of physical food environments: a qualitative study

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Special Interest Group: H. Policies and environments (SIG)

Purpose: Adolescence is a time when individuals experience increased independence from household influences, often spending more time outside of the home unsupervised. It is also a period when individuals develop an increasing reliance on, and reduced resistance to, peer influences. Social influences, and physical food environment determinants, of adolescent food choice have been described before, but little is known about the way these factors interrelate. This study aimed to use qualitative methods to understand the interrelations between adolescents' social environments and physical food environments and the role these play in determining adolescents' food purchasing and dietary behaviours.

Methods: Exploratory online focus groups were conducted with friendship groups of adolescents aged between 11-18 years attending secondary school or college in England. Forty-two participants took part in 12 online focus groups. Focus groups were transcribed verbatim and analysed thematically.

Results/findings: Preliminary findings suggest that most adolescents regularly visit food outlets with their friends. Adolescents described their independent food purchasing occasions, particularly when accompanied by friends, as an opportunity to treat themselves and recognised that their food choices in these settings were mostly unhealthy. Many participants described having limited opportunities to make their own food choices, so didn't want to waste these opportunities buying unenjoyable healthy foods. Going to certain food outlets, such as coffee shops and restaurants, provided a feeling of independence and maturity.

Habits and routines played a major role in determining the outlets visited by friendship groups. Many fast-food outlets were chosen for their convenience, not just in relation to time but also decision making and avoiding embarrassment. Friends often described knowing what their friends would purchase in food outlets. Adolescents identified price as a major influence on their food purchasing decisions, many claiming, however, that food promotions and being with friends resulted in spending more than planned.

Conclusions: Purchasing unhealthy food is one way adolescents assert their autonomy. Healthy manipulations to food environments may reduce the social desirability of unhealthy foods among adolescents. A greater understanding of how such changes align with other adolescent values is also required to develop effective and acceptable interventions.

Prevalence and Correlates of U.S. Adult Public Opinion on Restricting Junk Food Advertising to Children on Social Media: Analysis of the 2020 Health Information National Trends Survey

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Special Interest Group: H. Policies and environments (SIG)

Purpose: Social media platforms are increasingly used to advertise unhealthy foods and beverages (“junk food”) to children. Greater awareness regarding public opinion on restricting such advertising is important toward understanding the message environment and potential interventions. This study describes the extent that U.S. adults do or do not support restricting junk food advertising to children on social media and explores associations with sociodemographic, political, and health-related characteristics.

Methods: We used data from the U.S. National Cancer Institute’s 2020 Health Information National Trends Survey to estimate the prevalence of adult opinions on restricting junk food advertising to children on social media (strongly oppose; oppose; neutral; support; strongly support). Using weighted multivariable logistic regression, we examined associations of self-reported sociodemographic, political viewpoint, and health-related characteristics with “not supporting” such an advertising restriction (dichotomous outcome included neutral, oppose, and strongly oppose categories).

Results: The analytic sample included n=2852 adults (mean age 46.9 (SE 0.4) years; 50.0% male; 65.8% non-Hispanic White). The largest proportion of adults were neutral about advertising restrictions (40.6%). Support (23.3%) and strong support (22.8%) were more common than opposition (7.3%) and strong opposition (6.1%). The odds of not supporting advertising restrictions (53.9%) were 1.4 to 2.6 times higher among non-Hispanic Black (vs non-Hispanic White) adults, those without a college degree (vs with a college degree), reporting a moderate or conservative political viewpoint (vs liberal), and having a BMI in the overweight category (vs normal weight); each association statistically significant at $p < 0.05$. Adults with strong weight and diet-related cancer beliefs had 53% lower odds of not supporting junk food advertising restrictions (vs weaker beliefs; OR: 0.47 (95% CI: 0.36-0.61)).

Conclusions: Tailored communication strategies that increase public awareness of the links between weight, diet, and cancer, and the links between advertising and children’s diets—particularly for adults with higher BMIs, non-Hispanic Black adults, and those with lower education—may increase support for restricting junk food advertising to children on social media. Such advertising restrictions could improve children’s food environments to prevent diet-related diseases.

A Systems Thinking Approach for Retail Transformation (START) map in Grocery Settings

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Special Interest Group: J. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

Background: The Systems Thinking Approach for Retail Transformation (START) map uses systems mapping to guide planning and evaluation of healthy food retail interventions in community-based health-promoting settings. The START map captures the complexity of retail settings and identifies potential healthy food initiatives. However, it is yet to be applied to non-health promoting settings, such as grocery stores. This study aimed to test the feasibility and utility of the START map in grocery retail settings.

Methods: We analysed sixteen semi-structured interviews with grocery retail employees and health promotion practitioners involved in the implementation of grocery healthy food retail initiatives in regional Australia. Interviews were deductively coded against existing START map factors and inductive coding identified new factors that influence implementation of healthy retail in grocery store settings. The Implementation narratives were identified and the START map was updated to reflect these data.

Results: Multiple existing factors identified in the original START map were replicated in the grocery store interview data. Four new factors (competitiveness of market, complexity of organisational structure, number of food retail environments making healthy changes and total profit) and two new implementation narratives were also identified. New narratives demonstrates that healthy retail interventions in grocery settings need to consider: 1) the complexity of grocery store organisational structures, market competition and commercial concerns; and 2) the wider impact that grocery stores could have on changing community nutrition and influencing community expectations of healthy food retail cultures.

Significance: The START map is applicable informing the design, implementation and evaluation of healthy food retail policies in to grocery store settings.

Assessing the Spatial Reach of a Nutrition Incentive Program in a Large Urban Center

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Special Interest Group: H. Policies and environments (SIG)

Purpose: Low-income communities throughout the U.S. continue to experience limited access to affordable healthy foods. Nutrition incentive programs exist to provide low-income families a monetary resource to make healthy food more affordable and accessible. Many of these programs target participants of federal nutrition assistance programs (e.g. SNAP, WIC) and operate at farmers' markets. This study aimed to use geo-spatial analysis to evaluate availability of a nutrition incentive program in Chicago, IL (Link Match) to determine if nutritionally at-risk communities have adequate access.

Methods: Link Match is the largest nutrition incentive program in Illinois; it provides SNAP recipients a one-to-one dollar match (up to \$25) if they redeem their benefits at a participating retailer. We obtained 2018 spatial data on census tract-level socio-demographic characteristics and Link Match locations in Chicago, IL from a variety of sources including the City of Chicago, U.S. Census Bureau, and the Environmental Protection Agency. We found 57 retailers (e.g., farmers markets, food cooperatives) that offered Link Match across the city's 801 census tracts. We examined spatial lag and ordinary least squares (OLS) regression models to identify tract-level measures associated with distance (in miles) from the nearest Link Match retailer. Measures of interest included % non-Hispanic Black, % Hispanic, median household income, violent crime rate, per capita grocery store availability, and walk score.

Results: Most of the retailers that offered Link Match were located on Chicago's south and west sides. OLS regression models indicated that census tracts with a higher walk score or median household income below the city's median in 2018 were on average closer in distance to a Link Match retailer (both $p < 0.001$). However, census tracts in the highest quartile of violent crime rate were also significantly closer to a Link Match retailer ($p < 0.001$). After accounting for spatial dependency of census tracts, only violent crime rate was significantly associated with distance to the nearest Link Match retailer.

Conclusions: Link Match retailers in Chicago, IL appear to be located in areas of need with large populations of nutritionally at-risk families. However, these areas have high violent crime rates, which may deter program usage.

Machine learning approaches to characterize the obesogenic urban exposome

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Special Interest Group: H. Policies and environments (SIG)

Purpose: Characteristics of the urban environment may contain upstream drivers of the growing rates of obesity. However, research is lacking that considers the combination of environmental factors simultaneously, and what statistical methods are suitable to cope with the multitude of data at individual-level and environmental-level. We therefore applied various machine learning approaches to identify what environmental exposures of the urban exposome are consistently associated with Body Mass Index (BMI) across these approaches, and to reflect on the feasibility/interpretability of these methods.

Methods: A cross-sectional analysis was carried out using the baseline data of 14,829 participants from Occupational and Environmental Health Cohort (AMIGO) study. Self-reported height and weight (used to calculate the BMI) and lifestyle factors were assessed via questionnaires. Overall, 96 environmental exposures, including air pollution, traffic noise, green-space, and other built environmental neighborhood characteristics were estimated and linked to geocoded home addresses. We identified the most consistent exposure-obesity associations across the following approaches: a) Two dimension-reduction Methods: sparse group Partial Least Squares, Weighted Quintile Sum, b) Three variable selection approaches: Bayesian Model Averaging, Minimax Concave Penalty, Generalized Additive Model boost and c) One method from grouping of observations: Random Forest. The models were adjusted for relevant socio-demographic variables. The exposures were ranked according to the variable importance scores attributed by each approach, and an overall ranking across all approaches was calculated.

Results: Four neighborhood characteristics were among the top 5 most consistent associations related to BMI: the density of healthy food outlets in the neighborhood, the average value of the houses, the share of people with the lowest registered personal income and the share of divorced people in the neighborhood. Interestingly, a specific air pollutant (i.e., oxidative potential (OP) of the particulate matter) was also consistently associated with BMI. The median rank of OP across multiple approaches was 4/93 (93 exposures).

Conclusions: This study provides a comprehensive investigation of obesogenic environment. It strengthens the evidence for an association of characteristics of neighborhoods and air pollution exposure with adult obesity.

**O2.23 - Designing scalable health promotion strategies,
June 9, 2021**

Socioeconomic, political and geographical context determinants of implementation of policies promoting physical activity: a meta-review

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Special Interest Group: E. Implementation and scalability (SIG)

Purpose: This meta-review aims at examining if context-related determinants of implementation of policies promoting physically active lifestyle, i.e., promoting physical activity (PA) and reducing sedentary behavior (SB), receive strong and preliminary support in reviews and stakeholder documents. To identify the context-related determinants that facilitate or hinder implementation of policies, we applied the context and implementation of complex interventions framework (CICI) which comprises 7 domains: geographical, epidemiological, socio-cultural, economic, ethics-related, political, and legal. In addition, it was checked whether the context factors operate at the macro-level (nation-wide) or meso/micro-levels (organizational/individual).

Methods: Systematic search of 9 electronic databases and 9 document databases of major international stakeholders was conducted resulting in inclusion of k = 25 reviews and k = 17 stakeholder documents in further analyses. Context determinants that were corroborated in $\geq 50\%$ of analyzed documents were considered as preliminary supported by data, whereas determinants corroborated in $\geq 60\%$ of analyzed documents were considered as strongly supported by data.

Results: Across reviews/stakeholder documents addressing implementation PA/SB policies (k = 9) 3 context-related determinants from 2 CICI domains received strong support ($\geq 60\%$): setting's infrastructure (66.7%; the geographical domain) and knowledge/beliefs/abilities of the target population (88.9%) and the implementers (77.8%; both in the socio-cultural domain). Furthermore, 3 context-related determinants from another 2 CICI domains received preliminary support: individual/organizational economic resources (55.6%; the economic domain), policies in organizations involved/partner organizations (55.6%;), and interrelated policies and political pressure (55.6%; both in the political domain).

Conclusions: These findings suggest that geographical, socio-cultural, economic, and political context-related implementation determinants need to be accounted for when making plans for translating PA/SB policies into action. Clarifying the effects of the implementation context may improve the understanding of factors enabling a broad reach, implementation, and sustainability of successful policies.

Do adolescents' experiences of the barriers and facilitators of physical activity differ by socioeconomic position? A systematic review of qualitative evidence

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Special Interest Group: I. Socio-economic inequalities (SIG)

Purpose: Understanding young people's own perspectives is essential to developing successful interventions. This review aims to systematically identify and synthesise qualitative data on adolescents' experiences of the barriers and facilitators of physical activity (PA) to understand whether these experiences differ by socioeconomic position (SEP).

Methods: A systematic search of peer-reviewed literature was conducted across multiple databases (MEDLINE, Web of Science Core Collection, PsycINFO and ERIC) in August 2020. Two reviewers screened the title and abstract and full text of all studies in duplicate using Covidence. Studies were included if they reported qualitative data collected from adolescents (aged 11-18), a measure of SEP and focused on PA. Studies not published in English or before 2000 were excluded. Two authors appraised the literature using the Critical Appraisal Skills Programme qualitative checklist and extracted relevant data. Data were analysed following Thomas and Harden's (2008) methods for the thematic synthesis of qualitative studies.

Results/findings: After screening, 25 articles met the inclusion criteria. Four analytical themes emerged from the analysis: (1) Social Support (2) Gendered Experiences (3) Accessibility and the Environment (4) Other Behaviours and Health. These themes appeared across socioeconomic groups, however their narratives varied significantly. For example, adolescents of low SEP discussed the distance of PA facilities from their homes as a barrier, whereas those of high SEP highlighted proximity to PA facilities as a facilitator. Across the data, low SEP adolescents focused more on barriers to PA and adolescents from middle and high SEP reported more facilitators. The importance of school-based opportunities were emphasised by low SEP adolescents, due to limited opportunities they perceived outside the school environment. This was not the case for middle and high SEP adolescents who reported ample opportunities outside of school, including sports club membership and countryside access.

Conclusions: Narratives of common barriers and facilitators to PA varied by SEP. These findings can be used to inform how different socioeconomic groups may benefit, or be disadvantaged by current interventions and how strategies can be tailored to meet the needs of different groups.

Implementation processes of sugar-sweetened beverage taxes: Lessons learned from a scoping review

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Special Interest Group: E. Implementation and scalability (SIG)

Purpose: Sugar-sweetened beverages (SSB) are a major health risk. SSB taxation is seen as one possibility to curb the obesity trend, to affect consumer behaviour and to reduce costs within the modern food supply chain. 45 countries have currently implemented SSB taxes. However, the term SSB taxation differs in terms of objectives, type, rate, scale and revenue use. This study investigates the SSB tax implementation process that is what happens between adoption of the tax as law and its application.

Methods: Database searches were combined with grey literature up to February 2020 and hand searches for studies that report on implementation processes for SSB taxes. All studies were screened by two reviewers independently following pre-defined criteria. Data were extracted following a pre-developed and tested extraction sheet.

Results: Across 2,649 screened publications n = 3 papers met inclusion criteria. They contained the description of implementation process of six SSB taxation cases, covering Portugal, the Pacific Region (Fiji, Samoa, Nauru, French Polynesia), and the city of Berkeley (CA, USA). In three cases the tax was introduced to foster healthy diet, in two cases to raise revenues, and in one case to achieve both. The SSB tax was part of a complex bundle of initiatives in most cases. In two cases, it was combined with a specific awareness campaign. In two cases the Health Ministry took a leading role, and in two cases the Finance Ministry or the revenue and consumer authority, and in Berkeley it was the City Government. In four cases the tax collection was linked to existing mechanisms; a tax administration company was hired in one instance. Classification of products (syrup) and terms (natural sweetener) were mentioned as reasons for uncertainty related to tax implementation. Indirect effects of tax application mentioned were cost reduction for bottled water and switch to cheaper products.

Conclusions: The findings show that there is very limited data describing the SSB tax implementation processes. SSB tax implementation process varied in terms of objectives, type, scale, and leading organization. Based on the results, it is currently difficult to benchmark policy implementation process for the SSB taxation.

Bridging the gap of social distancing in health promotion with older people using digital media? - Challenges in a pandemic

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Special Interest Group: E. Implementation and scalability (SIG)

Purpose: Due to regulations regarding the COVID-19 pandemic in 2020 and 2021, two interventions with self-reliant, peer-moderated working groups for participants aged 60 and older were put on hold although the two annual interventions had just started before the lockdown. Aims of both interventions were to improve health and food literacy as well as self-management by regular in-person meetings. To counteract intervention drop-out, a bridging program was developed.

Methods: Telephone interviews with 23 peer-moderators on technical equipment for digital communication, media literacy and health promotion topics were conducted. The peer-moderators were trained in performing independently video conferences and telephone conferences as well as telephone chains.

Results/findings: A total number of 23 moderators leading 15 groups with 170 participants were involved in the interventions before the lockdown. Interviews with the moderators yielded only minor literacy of the participants to perform video and telephone conferences. Based on these findings, an adjusted bridging program was developed including health information and exercises which were sent by post, a telephone conference under instruction, six telephone chains and a training course for video conferences. The health information was distributed every four weeks and additionally the telephone chains were implemented. Both were well-accepted by all but two groups. Telephone conferences with the moderators were conducted only twice due to low acceptance. Despite training for video conferences, none of the groups managed to utilize digital media solely for communication. Nevertheless, only four groups, nine moderators and 94 participants quit the program during the lockdown.

Conclusions: The acceptance of the moderators is the key factor in opening up the participants to new communication channels. However, the participants were found to be a heterogeneous group. Due to insufficient digitalized homes, lack of digital devices or technical affinity, the distribution predominantly took place via postal dispatch. Even though the bridging program was well accepted, participants still rather waited until in-person meetings were allowed again instead of opened up to digital communication. To engage a vulnerable group like older adults in times of crisis, a regular, participatory developed, multichannel intervention can help to maintain the whole study.

Moving employees working from home towards a healthy working day

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Special Interest Group: E. Implementation and scalability (SIG)

Purpose: Since the outbreak of COVID-19, many employees work from home, resulting in more sedentary behaviour, less physical activity, and poorer mental and physical health. Out of a concern for the health of their employees and the positive association between employees' health and performance, many organisations invest in worksite health promotion (WHP) initiatives, such as onsite fitness facilities. As most of these initiatives are linked to the workplace, employees working from home cannot use them. This study examines how organisations can help employees maintain a healthy lifestyle when they work from home. To our knowledge, research on WHP initiatives for employees working from home is scarce, as many organisations are currently implementing these. We study three types of WHP (walking during the working day, taking short breaks and online physical activity classes) and examine under which conditions employees use these. We expect that this is the case when employees are enabled to combine WHP with their work and home situation, and their colleagues and partner join them.

Methods: Data are currently being collected among employees in many organisations using a factorial survey design. Participants rate 6 hypothetical situations (vignettes) describing WHP at home on how likely they are to use WHP (1 'definitely not' to 11 'definitely'). The type of WHP, duration, number of days working at home, if WHP use counts as working hours, colleague and partner joined use vary between vignettes. Demographics and current physical activity behaviour, among others, are measured in a survey. We will employ multilevel models where intention to use WHP is predicted by the vignette factors while controlling for employee demographics and current behaviour. This design is appropriate as it measures employees' intention to use WHP when these are not yet offered, informing employers in implementing WHP for employees working from home.

Conclusions: Our study shows which WHP initiatives employees are willing to use at home and how to promote use of these. As working from home is expected to remain common, this informs employers how to successfully promote the health of employees who work at home or away from the worksite.

Designing a Healthy Food-Store Intervention; a Co-Creative Process between Interventionists and Supermarket Actors

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Special Interest Group: E. Implementation and scalability (SIG)

Purpose: Healthy food-store interventions (HFIs) are promising tools for the reduction of non-communicable diseases through promoting healthier diets. The fit between the intervention components and the context (food-stores) is vital for their sustainability and scalability. Co-creation of HFIs by interventionists and contextual actors may improve this fit, and thus their sustainability and potential impact. However, little is known on the application of co-creative methods in the context of HFIs. Our aim is to share a case study regarding the integration of knowledge from contextual actors into HFI designs, through co-creative methods, to explore the challenges, advantages, and outcomes of such methods.

Method: This study was part of the Supreme Nudge project in which we co-created an HFI in the context of a Dutch supermarket chain. The process involved three increasingly specific phases of intervention design. Each phase was a cycle of specification (design ideas proposed by interventionists, based on literature, previous feedback, and pilot studies), evaluation (discussion with supermarket actors on factors relevant to implementation) and adaptation (adjusting intervention designs based on the discussion output), which fed back into the specification step of the subsequent phase. The evaluation discussions were transcribed and analysed through a combined deductive/inductive thematic analysis.

Results: The co-creative process helped us to develop four types of interventions: 1) price strategies, 2) product presentation and positioning 3) signage, and 4) interactive messaging. Through the co-creative process, interventions were aligned with some characteristics of the supermarket context, while simultaneously challenging others, which were detrimental to their health-promotion goals. Which context characteristics were aligned with, or challenged, varied between intervention types, and specific interventions. Some characteristics, such as financial interests were found to be both barriers and facilitators to implementation, depending on the intervention. Through the three phases of the design process a selection was made of intervention designs which were generally considered sustainable and feasible to scale up.

Conclusions: Our results illustrate the potential benefits of co-creative methods in guiding intervention design. We also reflect on the value of more easily accepted interventions to develop collaborative momentum and more radical interventions to drive more substantial changes.

**O2.24 - Physical activity and diet in disease prevention/management,
June 9, 2021**

Physical activity and sedentary behaviour in cardiac rehabilitation: does body mass index matter?

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Special Interest Group: K. Disease prevention and management

Purpose After an acute coronary syndrome, referral to cardiac rehabilitation is essential for prevention of recurrent cardiac events. Improving physical activity (PA) and sedentary behaviour (SB) are important goals of cardiac rehabilitation, which, however, might be (much) more challenging in patients with obesity than in those with normal weight. We aimed to investigate the relation between body mass index (BMI) class and (changes in) PA and SB during and after cardiac rehabilitation in patients who were discharged after an acute coronary syndrome.

Methods This analysis is based on the OPTICARE trial. PA and SB were objectively measured with an Actigraph GT3X+ accelerometer at start, directly after completion of a multidisciplinary 12-week exercise-based cardiac rehabilitation program, and 9 months thereafter. Outcome measures were step count, and duration of time (% of wear time) spent in light PA, moderate-to-vigorous PA, and SB. Patients were classified as normal weight (BMI 18.5-24.99 kg/m², n=82), overweight (BMI 25.0-29.99 kg/m², n=182), or obese (BMI ≥ 30.0, n=95). Linear mixed-effects models were applied to study the relation between BMI class and (changes in) PA and SB.

Results Patients (n=359) were 57.8 ± 8.9 years and 82.2% was male. At the start of cardiac rehabilitation, patients with overweight had similar PA and SB levels as those with normal weight. Patients with obesity made on average 952 steps/day less (5483 vs. 6435, p=0.010), spent 25 min/day less in light PA (3h 47min vs. 4h 12min, p=0.008), and 28 min/day more in SB (9h 40min vs. 9h 12min, p=0.011) than patients with normal weight. Improvements in PA and SB during cardiac rehabilitation were similar for all BMI classes (on average 507 steps/day more, 15min more in light PA, 5min more in moderate-to-vigorous PA, 20min less in SB). These improvements were maintained after completion of cardiac rehabilitation.

Conclusions Patients with obesity started cardiac rehabilitation with a less favourable PA and SB profile than patients with normal weight. Because all BMI classes showed similar improvements during cardiac rehabilitation, this deficit was preserved. Reconsideration of the cardiac rehabilitation program for patients with obesity is warranted.

Simulating reallocation of time between device-measured movement behaviours and risk of incident cardiovascular disease: analytic results and software development

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Special Interest Group: K. Disease prevention and management

Purpose: The main aim of this study was to investigate the association between device-measured movement behaviours and risk of incident cardiovascular disease (CVD) in middle- to older-aged adults. A secondary aim was to develop an R package ("epicoda") to facilitate epidemiological analyses using a Compositional Data Analysis (CoDA) approach to the exposure.

Methods: Between 2013 and 2015, participants in UK Biobank, a prospective cohort, were asked to wear a wristworn Axivity AX3 accelerometer for seven days. We applied a previously-developed machine-learning model to classify their movement behaviours as sleep, sedentary behaviour, light physical activity or moderate-to-vigorous physical activity. Using CoDA Cox regression, we investigated how reallocating time between movement behaviours was associated with CVD incidence. To support this analysis, we developed an R package to perform and present results of common epidemiological analyses, including linear, logistic and Cox regression analyses, using a CoDA approach to the exposure. This package, available at [github.com:activityMonitoring/epicoda](https://github.com/activityMonitoring/epicoda), also includes documentation (including worked examples) and automated testing.

Results/findings: Among 87,499 UK Biobank participants, there were 3,492 incident CVD events over a median 5.4 years of follow-up. Reallocating time from any behaviour to moderate-to-vigorous physical activity (MVPA), or reallocating time from sedentary behaviour to any behaviour, was associated with lower CVD risk. For an average individual in our data, reallocating 20 minutes/day to MVPA from all other behaviours proportionally was associated with 9% (7%, 11%) lower risk, while reallocating 1 hour/day to sedentary behaviour was associated with 5% (3%, 7%) higher risk. This analysis was performed using "epicoda", and the package has subsequently been used for other epidemiological analyses, including by users with no prior experience of CoDA.

Conclusions: Reallocating time from other behaviours to MVPA, or reallocating time from sedentary behaviour to other behaviours, was associated with lower risk of incident CVD. Interventions and guidelines should promote reallocating time to MVPA from other behaviours, and reallocating time from sedentary behaviour to light physical activity. By

providing flexible functionality for common analyses, alongside detailed documentation, “epicoda” may further facilitate use of a CoDA approach in epidemiology. Feedback to improve and extend “epicoda” is welcomed.

Associations between three diet quality indices and cardiovascular disease and all-cause mortality: a 19-year prospective analysis of the Australian Diabetes, Obesity and Lifestyle study

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Special Interest Group: K. Disease prevention and management

Purpose: Examining a variety of methodologies for assessing diet quality will inform best practice use of diet quality indices for assessing health outcomes. This study examined the association between three diet quality indices (Dietary Guideline Index, DGI; Dietary Inflammatory Index, DII; Mediterranean-DASH Diet Intervention for Neurodegenerative Delay, MIND) and risk of all-cause and CVD mortality up to 19 years later.

Methods: Data on 9,083 adults (mean 50.4 years; 56% female) from the Australian Diabetes, Obesity and Lifestyle study were used. A food frequency questionnaire was used to calculate three diet quality indices at baseline: DGI, DII and MIND. Cox proportional hazard models were used to estimate hazard ratios (HR) and 95% Confidence Intervals of all-cause and CVD mortality according to each diet quality index. Models were adjusted for age, sex, education, smoking, medication, physical activity and energy intake.

Results: New deaths due to all-cause (n=1,423) and CVD (n=336) mortality were identified during mean follow-ups of 18.1 and 17.5 years, respectively. The adjusted HR associated with one-point higher DGI for all-cause mortality was 0.99 (95% CI: 0.99, 0.99) and for CVD mortality was 0.99 (0.98, 0.99). The adjusted HR associated with one-point higher DII for all-cause mortality was 1.05 (1.01, 1.09) and for CVD mortality was 1.09 (1.01, 1.18). The adjusted HR associated with one-point higher MIND for all-cause mortality was 0.94 (0.91, 0.97) and for CVD mortality was 0.91 (0.85, 0.98).

Conclusions: Higher DGI and MIND predicted lower risk of all-cause and CVD mortality up to 19 years later, while higher DII predicted higher risk. The present findings show the applicability of all three diet quality indices for assessing risk of all-cause and CVD mortality, while highlighting the benefit of following national dietary guidelines, a Mediterranean diet and a low inflammatory and neuroprotective diet.

'If I had long hair I'd flick it': Experiences of E-cycling among Individuals with Type 2 Diabetes

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Special Interest Group: K. Disease prevention and management

Purpose: In recent years e-bikes have surged in popularity, with European sales predicted to increase from 3.7 million in 2019 to 17 million in 2030. The electrical assistance makes cycling more appealing to riders, while being of sufficient intensity to elicit positive health outcomes. Therefore, e-cycling may be acceptable for individuals with Type 2 Diabetes (T2D) who engage in less physical activity than their healthy counterparts. This study explored experiences of e-cycling among individuals with T2D, identifying key barriers and facilitators to engagement.

Methods: Semi-structured interviews were conducted with sixteen participants (Mean age=60, 50% female) from the intervention arm of a parallel-group two-arm randomized controlled pilot study (between October 2019 and March 2020). Participants received e-bike skills training and behavioural counselling prior to a 12-week e-bike loan. The interview guide was informed by the Theoretical Domains Framework. Data analysis followed the framework method and incorporated a deductive and inductive analytical approach.

Results: Participants were motivated to e-cycle as a means of improving their health, with limited consideration of potential environmental or financial impacts. A range of physical and mental health benefits were attributed to e-cycling, including improved fitness, mood and perceptible reductions in blood sugar levels. The electrical assistance enabled participants to ride faster, further and on hiller terrain than a conventional bicycle. These outcomes, and the ability to exercise outside, were associated with high e-cycling enjoyment, a key facilitator to engagement. For some participants the e-bike made cycling more accessible than conventional cycling. E-bike training provided participants with riding skills and enhanced road sense, thereby increasing e-cycling confidence. E-bikes were perceived as heavy, with some participants wanting smaller frames than usually recommended for their height to increase comfort. Barriers to e-cycling were primarily environmental including traffic, limited access to cycle paths, lack of safe parking and inadequate home storage. These barriers impacted riding for utilitarian purposes more than leisure riding.

Conclusions: E-cycling represents an appropriate and enjoyable form of physical activity for individuals with T2D. E-cycling initiatives should focus on the potential health benefits of e-cycling with the provision of e-bike training to enhance cycling skills and confidence.

A longitudinal study examining the influence of diet-related compensatory behavior on healthy weight management

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Special Interest Group: K. Disease prevention and management

Purpose: The maintenance of a healthy body weight can be challenging because of the omni-presence of tempting food cues. To deal with this temptation, one can compensate for moments of indulgence with a corresponding healthy behavior. This diet-related compensatory behavior can, for instance, mean that one engages in exercising after having consumed a calorie-rich meal the evening before. Because little is known about the influence of such behaviors on weight development, the aim of the present study was to investigate their effect on weight management over time in a non-clinical population.

Methods: Data from the first (2017) and third (2019) waves of the Swiss Food Panel 2.0, a longitudinal paper-and-pencil questionnaire, were analyzed. Participants (N2017 = 5238, N2017-2019 = 2638) answered questions related to their diet-related compensatory behavior, eating behavior, and physical activity levels. Correlations and multiple linear regressions were performed to investigate cross-sectional and longitudinal relationships between diet-related compensatory behavior, diet quality, and physical activity as well as body mass index.

Results: On a cross-sectional level, diet-related compensatory behavior was positively correlated with diet quality for both sexes (men: $r = .17$, $p < .001$; women: $r = .15$, $p < .001$), with physical activity for women only (men: $r = < .01$, $p = \text{ns}$; women: $r = .07$, $p < .01$), and with body mass index for men only (men: $r = .07$, $p < .001$; women: $r = .02$, $p = \text{ns}$). Longitudinal results showed that more frequent diet-related compensatory behavior predicted significantly higher physical activity levels ($b = .04$, $p < .01$) and better diet quality ($b = .05$, $p < .01$) two years later, but no changes over time in body mass index ($b = .01$, $p = \text{ns}$).

Conclusions: When applied in healthy doses, diet-related compensatory behavior may contribute to the maintenance of a balanced and healthy body weight, but it does not seem to be a successful strategy for weight loss over time.

"I have doubts on the vegetables"... Barriers and enablers associated with consumption of healthy diets in Nairobi, Kenya: A qualitative study.

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Special Interest Group: K. Disease prevention and management

Purpose: Type 2 diabetes (T2D) prevalence is increasing in Kenya and prevention efforts, such as promoting healthier diets, are needed. Understanding local perceptions, experiences and factors influencing consumption of healthy diets is important to develop culturally coherent interventions to maximise engagement and potential effectiveness. The aim of this qualitative study was therefore to explore the barriers and enablers of consumption of healthy diets in two different communities in Nairobi, Kenya.

Methods: Participants were recruited from two contrasting communities in Nairobi: one low-income (n=15, 7 female) and one middle-income (n=14, 6 female). In-depth interviews were audio recorded, transcribed verbatim and translated to English (if conducted in Swahili). Thematic analysis using socioecological framework identified barriers and enablers of healthy diets across four levels of influence: individual, social environment (networks), physical environment (settings) and macro-level environment (societal norms and regulatory actions).

Findings: At individual level, barriers (-) and enablers (+) of healthy diets included: limited knowledge of healthy foods/drinks (-), health conditions such as stomach ulcers (+), eating for satiety or survival (-) in the low-income community, and preference of sweet taste (-). Social environment barriers and enablers were the influence of children on household diets (+/-), learning from the experiences of others (+), upbringing (+/-) and peer influence among middle-income participants (+/-). Physical environment barriers and enablers included: inaccessibility of healthy foods (-) mainly in the low-income community, accessibility of unhealthy foods (-) mainly in the middle-income community and eating out (-). Macro-level barriers were poor food safety regulations (which created safety concerns of vegetables) and societal norms (use of unhealthy foods as treats or rewards and association of some foods with socioeconomic status).

Conclusions: Interventions to promote healthy diets should target various areas of influence. Increase in knowledge of health foods at the individual level should be complemented by increasing accessibility of healthy foods in low-income communities and efforts to make healthy diets the default choice in more affluent communities. At the macro-level, food safety should be ensured in both communities to alleviate safety concerns in some healthy foods, such as vegetables.

Dare2Share

Dr. Teatske Altenburg, Assistant Professor, Amsterdam UMC

Physical activity in the early years (2)

Current guidelines for physical activity in the early years (0-4 years) lack support by high-quality evidence. Existing studies use a large variety of measures of physical activity with limited or unknown validity. In this #Dare2Share session we aim to discuss these challenges when assessing physical activity in infants, toddlers and preschoolers: which operationalization reflects children's activity best? Should we operationalize physical activity differently in the different age groups? What methods are suitable to assess young children's physical activity?

Dare2Share

Dr. Jacqueline Mair, Senior Scientist, Singapore-ETH Centre

Designing and developing just-in-time adaptive interventions: current challenges and future directions

Just-in-time adaptive interventions (JITAI) are interventions that adapt based on an individual's situation to provide support that is delivered "at the moment and in the context that the person needs it most and is most likely to be receptive". We have recently developed a smartphone-delivered JITAI targeting physical activity and sedentary behaviour in older adults. Our JITAI design was underpinned by behaviour change theory and guided by recommendations from the literature. However, throughout the development process we encountered several challenges that required tough decisions and levels of compromise. To advance the state of the art, it would be beneficial for researchers to collaborate and share their approaches to some of the tensions that arise during JITAI design so that we may progress the field. We would like to share our own experiences with JITAI design, along with feedback from our participants on what aspects worked and didn't work for them. We would then invite participants to share their experiences and/or views.

S2.15 - Evaluating co-creation in health promotion innovations, June 9, 2021

Chair: Teatske Altenburg, Assistant Professor, Amsterdam UMC

Discussant: Janine Jurkowski, Professor and Associate Dean, University at Albany School of Public Health

Purpose: In co-creation projects, end-users are involved in the co-creation of an innovation. In health promotion, co-creation is a promising and innovative approach to increase the attractiveness and impact of innovations. This symposium addresses various aspects of the evaluation of co-creation in health promotion projects with children and adolescents: Which design fits the evaluation of the process, effects and impact of co-creation in health promotion? Which outcomes should be considered?

Rationale: Co-creation is increasingly used in health promotion to increase the effectiveness and impact of health promotion innovations and to address 'complex' problems such as the obesity pandemic. The underlying assumption is that co-created innovations better match the needs and interests of the end-users, which may be key to increasing participation of end-users in innovations and consequently increasing effectiveness. A sound evaluation of co-created health promotion innovations requests alternative designs and frameworks that also include the co-creation process and end-user identified outcomes.

Objectives: Our symposium will present and discuss the evaluation of various co-creation projects aiming to promote healthy sleep, physical activity and dietary behavior among children and adolescents. Specific objectives are: - Present examples of co-creation projects; - Discuss various challenges and solutions when evaluating co-creation projects with the audience.

Summary: Introduction of the rationale and relevance of using co-creation in health promotion innovations by Dr. Teatske Altenburg. Presentation 1: Guiding evaluations of youth-centred participatory action research: the Emke framework by Helga Emke, MSc. Presentation 2: Collaborating with adolescents in the development of a sleep intervention: a process evaluation by Dr. Maïté Verloigne. Presentation 3: Children as food designers: the potential of co-creation to make the healthy choice the preferred one by Martina Galler, MSc.

Format: Dr. Altenburg will provide a 5-min introduction to the topic. This will be followed by three 10-min presentations (followed by 1-2 clarifying questions each), representing three different aspects of the evaluation of co-creation projects. Prof. Dr. Janine Jurkowski will critically reflect on evaluation aspects of co-creation in health promotion and facilitate an interactive discussion with the audience (20 minutes). Depending on the number of participants, we will create breakout rooms for a discussion in smaller groups.

The symposium will be closed – in the main session with the whole group – by formulating lessons learned and practical recommendations for evaluating co-creation health promotion projects.

Guiding evaluations of youth-centred participatory action research: the Emke framework

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Special Interest Group: G. Children and families (SIG)

Purpose: Participatory Action Research (PAR) is a promising approach to increase the effectiveness and impact of health promotion interventions. A framework guiding the evaluation of interventions developed using a PAR approach is currently lacking. Existing frameworks do not include participants' experiences in collaborating as co-researchers and the impact of PAR projects on the co-researchers and the larger community. Therefore, the aim of this study was to develop a framework to guide the evaluation of our youth-centred PAR project LIKE (i.e. Lifestyle Innovations Based on Youth Knowledge and Experience).

Methods: We developed an evaluation framework (the Emke framework) based on three existing frameworks, including i) RE-AIM (reach, efficacy, adoption, implementation, and maintenance) (Glasgow et al.) because it is specifically developed for the evaluation of health promotion interventions in the real world; ii) the framework by Saunders et al. because it is developed for assessing health promotion program implementation; and iii) the framework by Jurrius focusing on the quality aspects of conducting youth-centred participatory research.

Results: The Emke framework is divided in the evaluation of 1) the co-creation process and 2) the implementation of co-created actions or innovations, which are both iterative processes. Our framework includes six elements: preconditions, recruitment, participants, iterative implementation, perceived effects, adoption and sustainability. All elements are applicable to both the co-creation and implementation process, yet the interpretation differs. For example, the element 'implementation' focuses on whether the actions are implemented as contextually appropriate, but also whether the co-creation process has been implemented as contextually appropriate; on the extent to which co-researchers could influence the co-creation process, and on the collaboration between researcher and co-researchers.

Conclusions: This study provides a framework which can be used to guide evaluations of PAR projects and gains a better understanding of barriers, facilitators and potential impact of PAR projects.

Collaborating with adolescents in planning a sleep intervention at school: a process evaluation

Prof. Maïté Verloigne¹, Prof. Benedicte Deforche¹, Ms. Ann Vandendriessche¹

¹Ghent University, Gent, Belgium

Special Interest Group: G. Children and families (SIG)

Background : The high prevalence of sleep deprivation and reduced sleep quality in adolescents is an important public health concern, suggesting effective interventions are needed. Using a participatory approach in which a group of adolescents is strongly involved in the development of sleep interventions is promising, especially when it is combined with the Intervention Mapping protocol to guide the development process. This approach not only leads to more tailored interventions, but also brings along benefits for the adolescents that were involved, such as increased feelings of self-esteem and empowerment. The aim of this study was to evaluate the process of collaborating with adolescents to develop a sleep intervention.

Methods: Two secondary schools offering general education in Flanders, Belgium, participated in this study. In each school, an action group with adolescents (age 13-15 years old, n = max. 10) was set up to develop a school-specific intervention. During weekly sessions (n= 29) with the researcher, the action groups went through the different steps of Intervention Mapping. Focus groups were performed with each action group at four different times points during the development process to evaluate the participatory process. Interviews were audio-recorded and thematic content analysis was performed using Nvivo 11.

Results: A sixteen-week long intervention focusing on healthy sleep, regular sleep patterns, screen time, physical activity, nutrition and relaxation was co-created. The participatory approach in combination with Intervention Mapping was very well received by adolescents. The action groups experienced ownership of the intervention through the shared decision-making and reported to have learned a lot about sleep as a health problem, handling big projects and social interactions. During specific steps of the development (the more theoretical steps), the adolescents suggested to use more active methods. Also, the adolescents expressed not always feeling supported by peers or teachers.

Conclusions: Combining a participatory approach with Intervention Mapping is feasible and the adolescents enjoyed the process. To maximize support for the intervention, future researchers should consider starting the fifth step of Intervention Mapping (i.e. planning for implementation) earlier in the process, and should look for more opportunities to involve peers outside of the action group.

Children as food designers: the potential of co-creation to make the healthy choice the preferred one

Mrs. Martina Galler^{1,2}, Ms. Kristine S. Myhrer¹, Dr. Antje Gonera¹, Prof. Gastón Ares³, Prof. Paula Varela^{1,2}

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Special Interest Group: G. Children and families (SIG)

Purpose: To tackle current obesity issues in the younger population, one valuable approach would be to involve children in the development of healthy food products that they would enjoy and actively chose. The aim of the study was to define a suitable process to brainstorm for healthy snack ideas with children, focusing on pleasure and healthiness. Two different settings were explored: creative focus group (CFG) and online setting (ONL).

Method: Three steps were defined to generate ideas: (1) Show & Tell: comprising a photovoice exercise, i.e. photo taking and -elicitation, commonly used in participatory research, to understand what children ate; (2) Reflect: a sorting task of the pictures to discuss and reflect their perception (3) Create: an idea generation step, in which a newspaper article describing the invention was created. Participants were recruited as convenience samples, from after-school activities (CFG) or school class (ONL). Three groups of seven 9-12 y.o. children participated in the 1.5 h CFG. For the ONL setting a school class, N=51, 10-11 y.o., participated within their Health and Nutrition education during three weeks.

Results: The proposed multi method process enabled an in-depth exploration of preadolescents' snacking habits. Pleasure, availability and convenience were identified as main drivers of their choices. Healthiness also emerged as a relevant factor and was discussed from many angles: i) in the context of physical exercise; ii) as a nuanced food characteristic (healthier and unhealthier versions of the same), linked to parental food restriction; iii) in relation to the frequency of consumption and to wellbeing. Both settings produced actionable ideas for new snacks, product names and packaging. Participants were more prone to consider healthiness in the presence of the moderator (CFG) while the peer-to-peer interaction in the ONL was more pleasure-focused. The feedback and observations from the study, particularly in the creative focus group setting, implied that the creative approach was highly engaging for participants.

Conclusions: Results from the present study demonstrate that preadolescents can create actionable new healthy food product ideas, using enabling and creative techniques, both in focus groups and online settings.

S2.16 - Behavior change maintenance: Insights from weight regain prevention interventions, June 9, 2021

Chair: António Palmeira, Associate Professor, CIDEFES, Universidade Lusófona
Discussant: Dominika Kwasnicka, Research Fellow, CRE Connected Health

Purpose: This symposium will present the mediation analysis results of a large-scale weight regain prevention (WRP) trial, discussing them in the light of behavior change (BC) maintenance theories. The NoHoW provides the test-bed for this symposium; a digital BC-based WRP 18 months intervention with 1500 weight loss maintainers.

Rationale: Understanding BC is key to develop safe and effective health promotion programs. Theories usually focus on initial processes, but in behavioral nutrition and physical activity, healthier and more desirable outcomes result from BC maintenance. We will use the insights from recent BC maintenance theories, applied to digital BC interventions in WRP.

Objectives: This symposium presents the mechanisms of action analysis from NoHoW's logic model while discussing them in the context of BC theories. Specifically, the symposium aims are to: 1. Present the NoHoW's logic models and the theoretical approaches that informed them 2. Present the NoHoW results from the mediation analysis with weight, physical activity (PA), and sedentary behaviors (SB) as outcomes; 3. Discuss the results in light of the BC maintenance theories. The overall aim is to facilitate the discussion and understanding of BC maintenance processes in WRP.

Summary: The first presentation aims to provide an up-to-date overview of the theoretical approaches that support sustained BCs in the context of WRP and logic models developed for the NoHoW trial. The second and third presentations will show results from NoHoW's mediation analysis, an application of the contents of the first presentation. A reflection and discussion is the aim of the last presentation.

Format: Dr. Palmeira will chair this symposium and will do a 7 min presentation of its aims and content. During this period, a polling system will be used to collect the initial impressions of the participants about which variables are most likely associated with BC maintenance. The 3 presentations will last 12 min + 3 min "burning" questions. Firstly, Dr. Marques will present the behavior change maintenance rationale supporting the NoHoW intervention Secondly, Dr. Palmeira will present the NoHoW's mediation analysis with weight as the outcome. Thirdly, Dr. Encantado will present the NoHoW's mediation analysis with PA and SB as the outcome. Finally, Dr. Kwasnicka will lead the reflection and discussion 23 min period. Polling and other interactive processes will be used.

Interaction: Polling and word-clouds will be used to promote interaction with participants. We are planning to have Dr. Palmeira, Encantado, and Marques presenting in the same virtual room.

The NoHoW trial logic models: Theoretical approaches and development

Dr. Marta Marques^{1,2}, Dr. Jorge Encantado², Dr. Cristiana Duarte³, Dr. Marcela Matos⁴, Prof. Pedro Teixeira², Prof. James Stubbs³, Prof. Berit Heitmann^{5,6}

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Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: This presentation will describe the process of development of the NOHoW trial logic models, emphasizing the theoretical frameworks that are represented in these models. The logic models were used as the basis for the content and features of the NoHoW digital Toolkit (TK)

Methods: The logic models were developed using an iterative approach of i. literature review on the most relevant theoretical frameworks in the context of physical activity, healthy eating and weight management, and ii. discussions within the research team and with external experts on each of the theoretical frameworks represented in the logic models. The logic models were developed to schematically represent the relationships between: (1) the primary and secondary outcomes, including behavioural outcomes; (2) the theoretical mediators that were hypothesized to explain the effect of the TK content on the primary and secondary outcomes; (3) the content of the TK; and (4) the hypothesized moderators of intervention effects.

Results: The available evidence formed the basis for the NoHoW research hypotheses that weight loss maintenance could be supported by strategies that promote (i) self-regulation (setting optimal goals and reviewing them, action and coping planning, action control) and motivation factors (promotion of autonomous motivation vs controlled motivation, intrinsic goals and flexible regulation to change behaviours and maintain weight loss), (ii) emotion regulation factors that may undermine self-management of energy balance related behaviours (reduce weight-related shame and self-criticism, reduce difficulties in emotion regulation, and increase psychological flexibility, mindfulness and compassion) and (iii) interactions between (i) and (ii). Therefore, The NoHoW trial presented 3 logic models, each corresponding to one of the intervention arms: Motivation + Self-regulation, Emotion Regulation, Combined Arm.

Conclusions: The NoHoW TK was one of the first theory and evidence-based digital approaches for WLM, systematically developed using standardized guidance, for which the logic models are a core step.

Motivational and self-regulatory skills' mediation effects in NoHoW - a weight regain prevention trial

Associate Professor António Palmeira¹, Dr. Marta Marques^{2,3}, Dr. Jorge Encantado³, Dr. David Sánchez-Oliva⁴, Dr. Inês Santos¹, Dr. Cristiana Duarte⁵, Dr. Marcela Matos⁶, Dr. Sofus Larsen⁷, Prof. Graham Horgan⁸, Prof. Pedro Teixeira³, Prof. Berit Heitmann^{7,9}, Prof. James Stubbs⁵

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Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: Preventing weight regain for 12 months is a difficult challenge. Behavior change theories suggest that motivation and behavior regulation skills contribute to behavior change maintenance, resulting in sustained weight management. We hypothesized that fostering one's basic psychological needs and autonomous motivation can lead to increased and better use of behavior regulation skills such as planning, which, in turn, will promote more stable behavior changes and weight changes.

The present study is a secondary analysis of the NoHoW trial. Its main goal is to test if a mediational model, resulting from the integration of self-determination theory and behavioral regulation approaches, could explain body weight change (primary outcome of the NoHoW trial).

Methods: The NoHoW is a three-center, large scale weight regain prevention trial. Adults who lost > 5% of their weight in the past year (N=870, 68.7% female, 44.10±11.86 years, 84.47±17.03 kg) participated in a 12-months digital behavior change based intervention. Weight and validated measures of motivational and self-regulatory skills' related variables were collected at baseline, six- and 12-months. Change variables were used in Mplus' mediation model analysis, according to NoHoW's logic model (data from study arms was pooled).

Results: The bivariate correlation analysis confirmed key mediators' potential effect on weight outcomes in the expected causal direction. The main analysis shows that about a quarter of the variance ($r^2=23.5\%$) of weight regain prevention is achieved via the mechanisms of action predicted in the logic model. Specifically, our analysis points out the role of a need for supportive climate care, improvements in needs satisfaction and goal contents leading to better weight regain prevention via improvements in self-regulatory skills, i.e., action control, coping, and action planning, in addition to increases in exercise controlled motivation.

Conclusions: These results contribute to a better understanding of behavior change maintenance in the context of weight regain prevention. While developing a digital behavior change intervention, researchers and practitioners should consider a need for supportive climate care, with content aiming at improving needs satisfaction and intrinsic goal contents.

Motivational and self-regulatory mechanisms of action on objectively measured physical activity during NoHoW - a weight regain prevention trial

Dr. Jorge Encantado¹, Dr. Marta Marques², Dr. Inês Santos³, Dr. Cristiana Duarte⁴, Dr. Marcela Matos⁵, Dr. Sofus Larsen⁶, Prof. Graham Horgan⁷, Dr. David Sánchez-Oliva⁸, Prof. Pedro Teixeira¹, Prof. James Stubbs⁴, Prof. Berit Heitmann^{6,9}, Associate Professor António Palmeira³

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Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: Behavioural interventions promoting physical activity (PA) are a promising approach to prevent weight regain. However, evidence about efficacy is still limited. There is a need to test mechanisms of action of theory-based digital behaviour change interventions focusing on PA promotion. The current study is a secondary analysis of the NoHoW trial and investigated the theory-based mechanisms of action that promote long-term PA outcomes. The NoHoW trial is a theory-based digital intervention with a 2x2 factorial design 18-month randomized controlled trial to promote weight loss maintenance through PA and eating behaviour regulation.

Methods: A subsample of 855 weight losers (M Age = 45.69 ± 11.37; 67.1% female) completed all questionnaires on target antecedent variable and mediators and had all objectively measured PA data available for 0, 6 and 12 months. We examined the direct and the indirect effects of Virtual Care Climate (autonomy support of intervention) on PA changes (6 to 12 months) through changes in the motivational and self-regulatory mediators (0 to 6 months), as conceptualized in the theory-based logic model.

Results: Model 1 tested the mediation processes on Steps and presented a poor fit to the data. Model 2 tested mediation processes on sedentary behaviour and PA intensity levels and presented reasonable fit to the data ($\chi^2/df = 8.12$, $p = 0.001$; CFI = .959; RMSEA = .091). Specific indirect effects showed that treatment care climate was positively and indirectly associated with self-regulatory skills via two distinct paths: i) intrinsic goals and autonomous motivation, and ii) BPN satisfaction and autonomous motivation. In turn, autonomous motivation was positively and indirectly associated with increases in the number of steps, moderate and vigorous intensity PA via action control. Only Action Control operated to directly predict long-term PA.

Conclusions: We found specific indirect effects on increases in PA via motivational and self-regulatory mechanisms. Post intervention changes in PA and in sedentary behaviour (12 months) were predicted by the logic model. Motivational and self-regulatory psychological mechanisms tested may represent possible targets for future interventions focusing on the promotion of long-term PA in adults trying to maintain their weight loss.

S2.17 - Update on the evidence examining the impact of policies on physical activity,

June 9, 2021

Chair: Catherine Woods, Chair, Physical Activity for Health, University of Limerick
Discussant: Dr. Jeroen Lakerveld, Amsterdam UMC

Purpose: This symposium will present evidence from specific domains identified as investments that work for increasing physical activity (PA), and how they may inform the development of PA policy monitoring, evaluation, and benchmarking.

Rationale: The 'Policy Evaluation Network' is a multi-disciplinary research network across Europe aimed at understanding the impact of public policy for promoting healthy lifestyles. The UN Sustainable Development Goals, the WHO Global Action Plan on PA and more recently ISPAH's 'Eight Investments That Work for PA' highlight the need to move beyond individual behaviour change to broader policy and system approaches. All refer to policy action to address on PA, yet the impact of policy on PA outcomes is unknown. Despite initial progress the systematic evaluation, benchmarking and monitoring of public policies to promote PA is in its infancy and remains a challenge both from an academic and a practical perspective.

Objectives: This symposium will present evidence from policy domains identified in ISPAH's 'Eight Investments' and how they will provide policymakers with a list of 'good practice statements' (GPS) and corresponding actions which the evidence has determined impact on PA. It is proposed that individual SLRs will be performed based on each best investment, with initial reviews focusing on 'school', 'transport' and 'sport' categories presented. Summary: Reviews will assist in GPS development which the evidence has determined impact on PA. By collating the evidence and demonstrating the depth of the science-base which informs these policy recommendations, each review will provide guidance to policymakers to use evidence-based or evidence informed policies to achieve the 15% relative reduction in physical inactivity as defined by GAPPA.

Format: Chair: Professor Catherine Woods, University of Limerick, Ireland Presenter 1: Liam Kelly, University of Limerick, Ireland - 'The evidence for the impact of policy on PA outcomes within the school-setting: A Systematic Review.' Presenter 2: Joanna Zukowska, Gdansk University of Technology, Poland - 'Which transport policies positively influence PA of the whole of society? A Systematic Review.' Presenter 3: Kevin Volf, University of Limerick, Ireland - 'Evidence of impactful Sport-for-All Policies: A Systematic Review.' Discussant: Peter Gelius, Friedrich-Alexander-Universität, Germany, will critique the evidence presented with respect to its usefulness to policy-makers and how these systematic reviews can help inform policy

benchmarking and may serve as a good basis for gathering information on policy implementation, monitoring and evaluation.

Interaction: Participants will be invited to partake in an open discussion to critique the evidence presented.

The evidence for the impact of policy on physical activity outcomes within the school setting: A systematic review

Prof. Catherine Woods¹, **Dr. Liam Kelly¹**, Mr. Kevin Volf¹, Dr. Blathin Casey¹, Dr. Peter Gelius², Mr. Sven Messing², Dr. Sarah Forberger³, Dr. Jeroen Lakerveld⁴, Dr. Joanna Zukowska⁵, Dr. Enrique García Bengoechea¹

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Special Interest Group: H. Policies and environments (SIG)

Purpose: Despite the well-established health benefits of physical activity (PA) most young people (aged 4–19 years) do not meet PA guidelines. Additionally, the impact of policies that support PA and associated behaviours is lacking. The aim of this systematic review is to ascertain the level and type of evidence reported in the international scientific literature for policies within the school-setting that contribute to increasing PA.

Methods: Six databases were searched using key concepts of policy, school, evaluation, and PA. Following title and abstract screening of 2,323 studies, 25 progressed to data synthesis. Methodological quality was assessed using standardised tools, and the strength of the evidence of policy impact was described based on pre-determined codes: positive, negative, inconclusive or untested statistically.

Results: Nine policy action areas for which there was evidence of impact were identified. These were whole-school PA policy, physical education, sport/extracurricular PA, classroom-based PA, active breaks, physical environment, shared use agreements, active school transport and surveillance. The bulk of the evidence (54%) was significantly positive, 27% was inconclusive, 9% was significantly negative, and 11% was untested. Frequency of evidence was highest in the primary school-setting (41%), while sport/extracurricular PA (35%) was the most common policy area. Results comparing relative strength (positive) of evidence are as follows; shared use agreements = 100%; whole-school PA policy = 60%; sport/extracurricular PA = 59%; physical education = 57%; and PA in classroom/active breaks = 50%.

Conclusions: Although the evidence presented supports the effectiveness of PA policy actions within the school-setting, they also caution against a “one-size fits all” approach and highlight the need for further evaluation of policy implementation to maximize translation into practice. Additionally, greater clarity regarding terminology, measurement, and methods for evaluation of policy interventions is needed, with suggestions provided.

Systematic review of transport policies influencing physical activity

Prof. Joanna Zukowska⁵, Ms. Anna Gobis⁵, Mr. Piotr Krajewski⁵, Ms. Romanika Okraszewska⁵, Ms. Agnieszka Morawiak⁵, Mr. Kevin Volf¹, Dr. Liam Kelly¹, Dr. Peter Gelius², Mr. Sven Messing², Dr. Sarah Forberger³, Dr. Jeroen Lakerveld⁴, Dr. Nicole den Braver⁴, Dr. Blathin Casey¹, Dr. Enrique García Bengoechea¹, Prof. Catherine Woods¹

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Special Interest Group: H. Policies and environments (SIG)

Purpose: Research consistently shows that active transport (i.e., walking, cycling or use of public transport) is associated with higher total daily physical activity (PA) than passive transport (e.g. driving a car). Public policies that support PA in transport facilitate active transport, and thereby overall PA levels, but the specific impact of such policies on PA behavior is still not well understood. The aim of this systematic review is to determine the level and type of evidence for policies in the area of transport that contribute to increasing PA.

Methods: Six databases were searched using key concepts of policy, transport, evaluation and PA. Methodological quality was assessed using standardized tools, and the strength of the evidence of policy impact was described based on pre-determined categories of positive, negative, inconclusive or untested.

Results: 32 of 2,549 studies were included in the data extraction, 15 of them were review papers and the other 17 were analyzed in the data synthesis. We identified 3 main transport policy areas with 60 individual policy actions that had a direct or indirect effect on PA. The policy areas were: convenient transport infrastructure, active travel promotion and shift of transport mode. They follow the methodological approach toward transport system (infrastructure, human behavior and transport modes). More than half of the policy actions identified (63%) had a positive effect on physical activity. Study quality ratings were moderate to good.

Conclusions: Physical activity levels can be increased by implementing policies which provide convenient, safe, and connected walking and cycling infrastructures as well as promote active traveling and strongly support public transport. There is clear evidence that policies to promote active travel work best when implemented in a comprehensive way (very often as a combination of several policies). This may include infrastructure and facility improvements as well as educational programs to achieve substantial shifts towards active modes.

Supporting sport for all outcomes through policy action: A systematic review

Mr. Kevin Volf¹, Dr. Liam Kelly¹, Dr. Blathin Casey¹, Dr. Enrique García Bengoechea¹, Prof. Catherine Woods¹

¹University of Limerick, Limerick, Ireland

Special Interest Group: H. Policies and environments (SIG)

Purpose: Promoting sport and recreation for all has been listed as an investment for supporting physical activity behaviour and for the realisation of individual rights. Yet patterns of sport participation indicate that some groups have greater opportunity to participate in sport than others. The aim of the study was to identify the best examples of policy actions which promote participation in sport with the specific research question of which policy actions impact sport for all outcomes?

Methods: Six electronic databases, MEDLINE (Ebsco), SportDiscus, Cinahl Complete, Cochrane Library, Web of Science and Scopus, were searched for scientific literature on sport policy in late August 2020. Two rounds of screening, title and abstract and full text review, were undertaken by researchers working independently of each other. Disagreements were resolved by consultation with a researcher acting as an independent third party. Included studies were limited to studies which evaluate policy actions based on their impact on sport

Results: Database search initially identified 6441 items of which 3745 were unique. Screening reduced this number to 30 studies which were included in the review. Some evidence supporting the policy actions “build sport infrastructure”, and “provide free access to targeted groups” was identified. A majority of the identified studies were from the United Kingdom and no studies using a randomised design were identified.

Conclusions: Some evidence for successfully implemented and effective policy actions were identified. However, policy actions may have limited impact in facilitating long term commitments behaviour change in inactive groups, to facilitate participation in the most inactive groups, broader inter-sectoral actions may be required outside of the limited domain of sport policy to increase sport opportunity. The evidence collected may be useful for coalitions of academics and public health stakeholders to advocate for policies which promote public health by creating a supportive environment for physical activity.

S2.18 - Capabilities for an active lifestyle – Co-producing knowledge with different population groups in communities and universities, June 9, 2021

Chair: Peter Gelius, Research Associate, FAU Erlangen-Nürnberg

Discussant: Maria Jansen, Professor, Maastricht University

Purpose Despite various initiatives for promoting physical activity at population level, developing interventions that lead to sustainable behaviour change and reach people with special needs remains a challenge. The symposium will show how change can be achieved by (a) using knowledge co-production (Rütten et al. 2017) and (b) conceptualizing outcomes by using capability theory (Frahsa et al. 2020). This combined approach allows for an active involvement of population groups, practitioners, policymakers and researchers to co-produce sustainable active lifestyles, and for acknowledging the individual, social and environmental conversion factors that enable individuals to become physically active.

Rationale Knowledge co-production and capabilities are well-known concepts in health promotion but are still not standard approaches in physical activity promotion. While our project examples strongly suggest that the combination is promising, it must be discussed when and why these approaches may lead to successful outcomes.

Objectives · Highlight challenges of promoting physical activity for different population groups and settings · Illustrate why a combination of co-production approaches and the capabilities concept is well-suited to address these issues and measure intervention success · Discuss if and how the proposed approach is applicable to other settings, populations, and health behaviours

Summary The chairs will introduce underlying concepts in the context of physical activity promotion. The three presentations will focus on vulnerable population groups in the community setting (men 50 plus, women in difficult life situations) and on students in the university setting. The discussant will link presentation results back to the theoretical framework and propose conclusions, which will subsequently be discussed with symposium participants.

Format ·

Tittlbach & Gelius: Introduction (9 mins) · Strobl et al.: Men 50 plus, community setting (ACTION for men) (12 mins) · Till et al.: Women in difficult life situations (BIG) (12 mins) · Helten et al: Students, university setting (Smart Moving) (12 mins) · Jansen: Summary, conclusions, discussion with symposium participants (15 mins)

Interaction Discussion will be facilitated using both the chat function (for questions) and electronic tools such as quick polls (e.g. on familiarity with/suitability of approaches used). References Frahsa, A., Abel, T., Gelius, P & Rütten, A. (2020). The capability approach as a bridging framework across health promotion settings: theoretical and empirical consideration. Health Promotion International, 10.1093/heapro/daaa076 Rütten, A., Frahsa, A., Abel, T., Bergmann, M., de Leeuw, E., Hunter, D. et al. (2017). Co-producing active lifestyles as whole-system-approach: theory, intervention and knowledge-to-action implications. Health Promotion International, 34(1), 47-59. 10.1093/heapro/dax053

Community Capacity Building for Improving Capabilities for Physical Activity in Men 50 plus

Dr. Helmut Strobl¹, Mr. Malte Kehl², Prof. Julika Loss³, Dr. Susanne Tittlbach¹

¹University of Bayreuth, Bayreuth, Germany, ²University of Regensburg, Regensburg, Germany, ³Robert Koch-Institute, Berlin, Germany

Special Interest Group: E. Implementation and scalability (SIG)

Purpose: The participation of men aged 50 and older (50 plus) in programs to promote health-enhancing physical activity (HEPA) is low. Due to socially constructed roles and expectations, men 50 plus are more likely to deny engagement in those programs, to prove adherence to the construct of masculine “toughness” or strength. Improving social and environmental conversion factors by working with rather than against sociocultural influences on behaviour is a promising way to increase participation rates of men in health promotion programs. However, there is a lack of capacity in many communities to conceptualize and implement corresponding programs. For that reason, ACTION for men (A4M) aims to develop capacities for gender-sensitized HEPA promotion addressing men 50 plus by a participatory approach in two rural communities in Bavaria, Germany.

Methods: We implemented two participatory stakeholder groups, one per community. These groups were motivated to develop and implement gender-sensitized measures for HEPA promotion for men 50 plus. For measuring capacity building processes, a semi-standardized monitoring protocol was used to document all group meetings (23 protocols). Additionally, we conducted 13 semi-standardized interviews with group participants and drop-outs to capture their perspectives on capacity building. All documents were analysed using thematic analysis along relevant dimensions of capacity building suggested in literature (e.g., problem solving, resource mobilization, leadership).

Results: We successfully established stakeholder groups that conceptualized and implemented a range of local measures meant to increase HEPA among men 50 plus (e.g. new gender-sensitized HEPA programs with a low-threshold access). Capacity building was successful to a certain degree (e.g., regarding participation, problem assessment, and resource mobilization), but stalled after first meetings. Capacity building processes differed between the two communities in terms of leadership, sustainability and critical awareness.

Conclusions: A successful capacity building approach can result in improved social and environmental conversion factors regarding physical activity for men 50 plus. Success of the approach mainly depends on the composition of stakeholder groups and inherent power relations. The effect of the implemented measures on individual conversion factors and achieved functionings within the framework of the capability approach needs further investigation.

Improving capabilities within a community setting to promote physical activity among women in difficult life situations

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Special Interest Group: E. Implementation and scalability (SIG)

Purpose: Only 20% of women in Germany reach recommended levels of physical activity (PA). Levels decline with socio-economic status due to various barriers, including high participation fees or culturally insensitive offerings. The BIG project (“movement as investment in health”) aims at counteracting these health inequalities by using a community-based participatory approach to promote PA among women in difficult life situations. It further aims at increasing capabilities for PA and empowering women to control their own health, while also improving health promoting structures in the setting.

Methods: Using the participatory method of cooperative planning, BIG involves the women addressed, local decision makers, practice partners and researchers in a transdisciplinary exchange. In a series of sessions, a planning group jointly develops and implements PA offers tailored to the women’s needs and interests. A variety of methods (e.g. interviews, process evaluations, questionnaires, etc.) has been employed to evaluate BIG, e.g. collecting data on participation during planning session, outcomes, and the scale-up of BIG across Germany.

Results: Since 2005, a total of 17 communities have implemented BIG. The average lifespan of project implementation is 4 years. Up to now, 7 communities have succeeded in sustainably implementing the project, with over 800 women participating regularly in PA offers. Analysis shows a development of structural conversion factors within different communities: Low-threshold PA offers, strengthened social-networks between women, improved local policy networks ensuring sustainability, and a local project coordination managing BIG activities on site. Regarding individual conversion factors, women participating in planning sessions increased their self-efficacy and knowledge of organisational/political processes, and were empowered to voice their interests. For women partaking in PA offers, positive effects on physical and mental well-being were found. Further, planning sessions led to increased agency of all planning group participants.

Conclusions: BIG demonstrates that participatory and transdisciplinary research interventions can have a positive impact on participants’ capabilities and community PA structures. The long-term effects of the intervention at both the structural and individual level is currently examined in a follow-up project (NU-BIG). The results will provide insights on the sustainability of BIG’s impact on women’s capabilities for PA.

Addressing physical activity and sedentary behavior among students in the university setting

Ms. Jessica Helten¹, Dr. Sascha Hoffmann¹, Dr. Julia von Sommoggy², Dr. Jana Rueter², Prof. Julika Loss³, Dr. Susanne Tittlbach¹

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Special Interest Group: E. Implementation and scalability (SIG)

Purpose: Even though young adults are relatively active in comparison with other population groups, only about 50% reach the national recommendation of 150 min physical activity (PA) per week. Additionally, sedentary behavior (SB) among students is high, especially during their time spent on campus. SB on campus seems to be a social norm, which is ingrained in most typical behavioral patterns of these institutions: during lectures, in the library, often during breaks and lunch time. Improving social and environmental conversion factors is a promising way to increase PA and decrease SB of students on campus. However, there is a lack of structural measures in most universities breaking the social norm and offering possibilities to interrupt sitting-time and integrate PA. Therefore, Smart Moving aims to develop capacities for the student-oriented addressing of PA and SB by using a participatory approach in one university setting in Bavaria, Germany.

Methods: We carried out an online student ideas competition and implemented a participatory stakeholder group. The group members were motivated to develop and implement student-oriented measures for addressing PA and SB of students on campus. For measuring capacity building processes, a semi-standardized monitoring protocol was used to document all group meetings (8 protocols) and we conducted 4 semi-standardized interviews with group participants to capture their perspectives. All documents were analysed using thematic analysis along relevant dimensions of capacity building (e.g., problem solving, resource mobilization, leadership).

Results: We successfully carried out the student ideas competition and established a stakeholder group that conceptualized and implemented a range of measures meant to increase PA and decrease SB among students (e.g. active break in lectures, movement-enhancing library workplaces, nudged walking paths on campus). The effectiveness and acceptance of the measures was different. Capacity building was successful to a certain degree (e.g. regarding problem assessment and resource mobilization).

Conclusions: An effective capacity building approach can result in improved social and environmental conversion factors regarding PA and SB for students on campus. The success mainly depends on the composition of stakeholder groups. The effect of the implemented measures on achieved functioning needs further investigation.

S2.19 - What are the important factors to determining the children's independent mobility? Insights into children and family factors, June 9, 2021

Chair: Francisco Javier Huertas-Delgado, Professor, La Inmaculada Teacher Training Centre

Discussant: Palma Chillón Garzon, Assistant Professor, University of Granada

Purpose: This symposium aims to present and discuss key factors associated with children's independent mobility from three countries around the world, with different social and geographical settings.

Rationale: Children's independent mobility, which is defined as a child's freedom to commute or play around their neighbourhood without parental supervision, is related to higher physical activity and active commuting to school, which is important because globally children are insufficiently active. Additionally, independent mobility contributes to children's emotional, social, and cognitive development. Consequently, understanding which factors are important is crucial to increasing children's independent mobility rates.

Objectives:

This symposium will present recent findings from studies conducted in Europe, North America and South America on the associations between socio-ecological factors and independent mobility. The specific objectives of this symposium are: -

1. Discuss what key factors are associated with children's independent mobility in three countries. –
2. Emphasize the importance of different factors in order to increase the independent mobility. –
3. Stimulate discussion regarding the implications of the findings for future research and policy action.

Summary: Firstly, the chair of the symposium will provide a brief background on the topic allowing presents to focus on their main findings. Presentations will showcase recent findings regarding key factors influencing children's independent mobility. The speaker from Spain will present the influence of children's characteristics, the speaker from Canada will present the perspectives and negotiations within the family unit, and the speaker from Chile will show the associations with the parents' behaviours. The audience will have a chance to take part using interactive apps to promote engagement.

Format:

- 1) Brief introduction of 5': Dr. F. Javier Huertas-Delgado, University of Granada, Spain.
- 2) Study First Presenter (15'): Patricia Gálvez-Fernández, University of Granada, Spain.
- 3) Study Second Presenter (15'): Dr. Negin A. Riazi, The University of British Columbia, Canada.

4) Study Third Presenter (15'): Dr. Fernando Rodríguez-Rodríguez, Pontificia Universidad Católica de Valparaíso, Chile. After each presentation, a short time will be provided for delegates' participation and the possibility to provide some oral questions to presenters moderate by discussant Dr. Palma Chillón (University of Granada, Spain).

Interaction: The interaction with the presenters will be through the presentation app e.g. zoom, google meet) and the participation of the audience will be followed by SLIDO (www.sli.do). Several questions will be launched to the ISBNPA members who participate in the symposium and the results will be broadcasted live.

Is independent mobility related to gender and age of Spanish youth? A cross-sectional study from 2010 to 2017

Miss Patricia Gálvez-Fernández¹, Dr. Palma Chillón¹, Miss Romina G. Saucedo-Araujo¹, Dr. Guy Faulkner², Dr. Francisco Javier Huertas-Delgado³, Dr. Manuel Herrador-Colmenero^{1,3}

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Special Interest Group: G. Children and families (SIG)

Purpose: The aim of this presentation is to describe and to analyze the associations between independent mobility (IM) with age groups and by gender in Spanish children and adolescents aged 6-18 years old from 2010 to 2017.

Methods: Data were obtained from 11 studies conducted across Spain from 2010-2017. The study sample comprised 3,460 children (6.0-11.9 years old; 50.1% girls) and 1,523 adolescents (12.0-18.0 years old; 50.4% girls). Individual data included age and gender of the participants, and their accompaniment to school. The IM was self-reported in the 11 studies and different questions were used. The answers were categorized into "accompanied by adults" and "independent mobility". Participants who reported commuting accompanied by a parent, caregiver, and/or neighbor were categorized as accompanied by adults. Participants who reported commuting alone, with friends and/or brothers were categorized as IM. After collapsing studies, age was classified into categorical variables of two-year groups from 6 to 18 years old. Several logistic regressions models were performed to analyze the associations between IM and gender, in children and adolescents, and to analyze the relationships between IM and each age group. An additional analysis was performed to analyze the changes in IM across 2010-2017 using multilevel logistic regression analysis. In order to control the analyses, the population density and city income were used.

Results: About 20% of the children and 90% of the adolescents commuted independently ($p < 0.05$). Additionally, in children, boys showed a higher percentage of IM than girls ($p < 0.01$), but no differences by gender were found among adolescents. The rates of IM in Spanish children and adolescents have remained stable during the 2010-2017 period.

Conclusions: In the period 2010-2017, this study present higher levels of IM in adolescents than in children, where IM was associated with higher age groups in boys but not in girls. Additionally, the rates of IM in Spanish children and adolescents have remained stable over these years, reflecting the changes in Spanish society of more friendly environment perceptions and gender equality. Future interventions have to focus on children and develop specific strategies for the girl's inclusion.

“I don’t even know where my kids are right now, they’re out there somewhere”: Exploring family perspectives of children’s independent mobility

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Special Interest Group: G. Children and families (SIG)

Purpose: While children’s independent mobility (CIM) is associated with various benefits (e.g., physical activity) there is evidence of a generational decline in CIM in western countries. It is important to understand how CIM is currently negotiated between children and their parents. Limited qualitative research has explored families’ perspectives on CIM. The purpose of this qualitative study was to examine children’s and parents’ perspectives and negotiations of CIM within the family unit.

Methods: A social constructivist approach was adopted, and face-to-face interviews and walk-along interviews were conducted with parents (n=44) and children (10-13 years old) (n=22) respectively in Vancouver, Canada. Families were recruited from 3 distinct neighbourhoods in the Greater Vancouver Area that varied in their physical environments. Interviews were audio-recorded, transcribed verbatim, and a thematic analysis was conducted.

Results: Four key preconditions were identified that facilitated negotiation of independent mobility between parents and children within this sample. These included the 1) influence of parents’ childhood experiences regarding their view of CIM (e.g., positive interpretations of their childhood on parenting practices); 2) the role of children’s individual characteristics on their independent mobility (e.g., child’s confidence in their own abilities); 3) family communication as a key coping strategy (parent-parent and parent-child communication); and 4) the influence of positive perceptions of the social environment on CIM.

Conclusions: The findings suggest that CIM flourishes where and when conditions are conducive. Multi-level and multi-sectoral approaches should be considered for addressing CIM. It may be particularly helpful to address individual- (e.g., skill training, confidence), interpersonal- (e.g., communication between parents and children), social- (e.g., perceptions of neighbourhood environment), built environment- (e.g., implementing safety measures like traffic calming), and policy-level factors (e.g., policies addressing factors like substance use harm reduction or supporting CIM behaviours). Efforts to help children gain the appropriate skills and confidence to safely navigate their neighbourhood as well as addressing perceptions of neighbourhood safety through building social connections and capital will be an important step forward.

Which parental factors to predict the independent mobility to school in children and adolescents?

Dr. Fernando Rodríguez-rodríguez¹, Miss Patricia Gálvez-Fernández², Dr. Francisco Javier Huertas-delgado³, Miss María Jesús Aranda-Balboa², Miss Romina G. Saucedo-Araujo², Dr. Manuel Herrador-Colmenero^{2,3}

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Special Interest Group: G. Children and families (SIG)

Purpose: This study aimed to analyse which of the parental factors (i.e., sociodemographic, physical activity (PA) or active commuting to work) can explain the independent mobility to school (IMS) in children and adolescents. Considering that, the parental factors have been previously studied independently but not in combination nor considering their complex interrelations.

Methods: A total of 684 parents (52.8% mothers, 47.2% fathers; 43.4±6.5-year-old) and their offspring (56.4% girls, 43.6% boys; 11.3±2.7-years-old) were included in this study. The parents self-reported their sociodemographic characteristics (i.e., salary/month, highest educational level, socioeconomic level, car availability and distance to work), PA (i.e., ≤ or >150 minutes weekly on moderate to vigorous PA) and mode of commuting to work (i.e., active or passive). The offspring's mode of commuting to and from school and their accompaniment mode were also reported. T-test and chi-square test were used to study differences by parental gender. Binary logistic regression models (odds ratio=OR) and stepwise analysis were performed to study the associations between the parents' factors and IMS of their offspring. IMS was established as the dependent variable, and each parent's factor was included as an independent variable in separate models.

Results: No car availability and less distance to work were positively associated with higher IMS in children (OR=2.22; OR=2.29, respectively). Less mother salary/month (OR=2.75), no car availability (OR=3.17), and mother passive commuting to work (OR=2.61) were positively associated with higher IMS in adolescents. In model 1 of stepwise analysis (sociodemographic factors), the strongest predictor for IMS was no car availability (OR=11.26; CI=1.32–95.85). Less mother's salary was the main IMS predictor in adolescents (OR=6.18; CI=1.77–21.55). In model 2 (PA and mode of commuting to work) less distance to work and mother's passive commuting to work, were positively associated with IMS. In model 3 (all factors) distance to work was identified as a predictor in children (OR=2.18; CI=1.10–4.28) and no car availability in adolescents (OR=6.53; CI=2.23–19.08).

Conclusions: Parental sociodemographic factors, such as salary, distance to work and car availability, were associated more strongly with IMS than parental PA and mode of commuting to work.

Dare2Share

Prof. Greet Cardon, Professor, Ghent University

Health CASCADE: Evidence-based co-creation methodology to tackle the complexity of modern global health problems

Health CASCADE is a EU funded consortium of 7 universities and 14 partner organisations from 8 European countries (Belgium, France, Germany, Greece, The Netherlands, United Kingdom, Spain, and Sweden). The aim is to elevate co-creation to a scientific-based methodology to tackle public health issues, and decide what to prioritize in training early stage researchers. In this #Dare2Share session we want to open up debate about co-creation and enable sharing of best practice. We would like to use the #Dare2Share session to: a) advertise our network, b) invite colleagues to join it to discuss upon some tasks of the project, and c) recruit colleagues who may be interested in contributing to train the 15 Early Stage Researchers that will be hired within our project.

Dare2Share

Dr. Alessandra Prioreschi, Researcher, University of the Witwatersrand

Rapid feedback of accelerometer data in low- and middle-income countries (LMICs)

This session is aimed at finding means to rapidly feedback accelerometer data to participants in a tangible (material), easy to understand, interactive way - that does not rely on access to technology and/or mobile data/WiFi. Participants in impoverished communities have less access to technological resources and thus engagement with their data. As the rest of the world moves into the data revolution, how do we prevent LMICs from being left behind, and from not receiving the same benefit from their data? I would like to discuss ways to counteract these issues in a novel, scalable way.

**O3.25 - Engaging families in improving lifestyle behaviors,
June 10, 2021**

Changes in toddler diet and activity in a family wellness program: A pilot randomized control trial

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Special Interest Group: G. Children and families (SIG)

Purpose: This study determined the preliminary effect of a wellness playgroup on diet, moderate to vigorous physical activity (MVPA), and sleep among toddlers.

Methods: Families with toddlers (12-36 months) were recruited from the community and randomly assigned to receive 10-weekly 90-minute sessions of the Families Understanding Nutrition and Physically Active Lifestyles (FUNPALs) Playgroup, or a health education program, Healthy Toddler Parent Group (HTPG). The FUNPALs Playgroup, was based on Social Cognitive, Family Systems, and Self Determination Theories. Facilitators created a fun environment where parents could learn about positive parenting and toddler health, play with their children, and connect with other families. HTPG included instruction and discussion on diet and activity recommendations for toddlers (children not included). Measures were completed pre (T1) and post program (T2). Snacks and sugar sweetened beverages (SSB) intake were assessed with the Kids Bite Food Frequency Questionnaire (FFQ) (Aguilar et al., 2014). Fruit and vegetable (FV) intake was assessed with the Kids Bite FFQ and with skin carotenoid concentration intensity measured by non-invasive reflection spectroscopy, which is a biomarker of intake of carotenoid rich FV. MVPA and sleep were assessed by 8-day actigraph wGT3x (Pensacola, Florida) accelerometers. Repeated measures ANOVA's tested group differences on diet and activity variables.

Results: The sample (n=50) comprised toddlers (Mage = 27 months, 58% males) and parents (Mage = 31.7 years, 84% female), who were Non-Hispanic white (44%), Hispanic/Latino (38%), and/or African American (32%). There was a greater decrease in SSB consumption from T1 to T2 among FUNPALs Playgroup toddlers when compared to HTPG toddlers [Wilk's Lambda = .802, F (1, 36) = 8.87, p = .005]. Both groups showed increased skin carotenoid concentrations from T1 to T2 [Wilk's Lambda = .864, F (1, 33) = 5.206, p = .029]. Per Cohen (1988), the effect on SSB consumption (partial eta squared = .20) and on skin carotenoid intensity (partial eta squared = .14) represented large effects. There were no effects on snack, MVPA, or sleep.

Conclusions: This study provides preliminary evidence that a family wellness playgroup program may have a large positive effect on toddler diet quality.

How is Co-Parenting Quality Associated with Food Parenting Practices Among Mothers and Fathers of Preschool Aged Children?

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Special Interest Group: G. Children and families (SIG)

Purpose: Co-parenting quality, which refers to the ways that parents do or do not coordinate with and support each other, has been shown to have a strong influence on child outcomes. However, little is known about how co-parenting quality may influence food parenting practices and few studies have considered fathers' food parenting practices and their perspectives on co-parenting. This study aimed to investigate how co-parenting quality is associated with both mothers' and fathers' food parenting practices.

Methods: A cross-sectional analysis was conducted of 58 mothers and 40 fathers enrolled in a family-based health promotion intervention study. The Coparenting Relationship Scale was used to measure co-parenting quality and the Comprehensive Feeding Practices Questionnaire was used to measure coercive control, structure, and autonomy control food parenting practices. Linear regressions using generalized estimating equations were used to examine associations between co-parenting quality and food parenting practices in mothers and fathers. Household income, parent race/ethnicity, and intervention status were included in all models.

Results: Among mothers, higher co-parenting quality was associated with lower use of food for emotional regulation ($\beta = -0.20$, $p = 0.01$), restriction of food ($\beta = -0.18$, $p = 0.02$), and allowing children to control food intake ($\beta = -0.14$, $p = 0.01$), and with higher encouragement of a balanced and varied diet ($\beta = 0.13$, $p = 0.01$), provision of a healthy home environment ($\beta = 0.25$, $p < 0.0001$), and modelling of healthy eating behaviours ($\beta = 0.12$, $p = 0.05$). Among fathers, higher co-parenting quality was associated with lower pressure to eat ($\beta = -0.19$, $p = 0.01$) and with higher encouragement of a balanced and varied diet ($\beta = 0.10$, $p = 0.05$) and provision of a healthy home environment ($\beta = 0.24$, $p = 0.0007$). All results were independent of covariates.

Conclusions: Higher co-parenting quality was associated with more positive food parenting practices among both mothers and fathers; however, more consistent results were found among mothers and for structure-based food parenting practices. These findings suggest that co-parenting quality should be considered in child feeding research.

Parents' Understanding of Ingredients in the Drinks They Serve Their Children: Opportunities for Nutrition Education and Improved Labelling

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Special Interest Group: G. Children and families (SIG)

Purpose: Despite expert recommendations against serving added sugars and non-nutritive sweeteners to young children, many children consume drinks with these ingredients. Confusing labelling and misleading claims may contribute to parents' misperceptions of the healthfulness of children's drinks. Our objective was to assess parents' perceptions regarding sweetened drinks and unsweetened juices they serve their children, including accurate understanding of product ingredients.

Methods: A cross-sectional online survey (n=1,614) to parents of young children (1-5 y) assessed perceptions regarding sweetened fruit-flavored drinks (fruit drinks and flavored water) and unsweetened juices (100% juice and water/juice blends) they provided their child in the past month, including product healthfulness, reasons for providing, and knowledge of product ingredients (added sugar, non-nutritive sweeteners, percent juice). Analysis of variance was used to compare perceived healthfulness of drinks and ingredients. Logistic regression models were used to estimate association between nutrition label reading practices and accuracy in ingredient perceptions, accounting for potential confounders.

Results: Top reasons for providing included child liking and being healthy for unsweetened drinks, and being inexpensive, child's request, and being a special treat for sweetened drinks. On average, parents perceived unsweetened juices to be healthier than flavored waters and fruit drinks ($p<0.05$). Misperceptions regarding added sugar, non-nutritive sweeteners and percent juice contained in drinks were common, and more frequent in fruit drinks and flavored water. Parents who reported reading the nutrition label more often were not more accurate in assessing product ingredients.

Conclusions: Inaccurate understanding of ingredients contained in drinks parents served their young children are widespread. Public health efforts should seek to improve labelling and nutrition education to better inform parents.

Are patterns of family-dinner practices associated with child and parent diet quality and body weight?

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Special Interest Group: G. Children and families (SIG)

Purpose: Research has demonstrated the importance of specific family meal characteristics such as family member presence, fast-food consumption and media usage in relation to health outcomes. However, analyses typically do not identify heterogeneous subgroups that could inform targeted interventions. This study aimed to identify empirically-derived subgroups using family-dinner (FD) practice data and examine their associations with child and parent diet quality and body weight to better understand the impact of various family-dinner practices on diet quality and health.

Methods: This secondary data analysis used baseline data from the NU-HOME randomized controlled trial with 114 7-to 10-year-old children and their parents in rural Minnesota. Guided by the Social Cognitive Theory, the following parent survey data were analyzed: FD frequency, presence of parents/most family members, serving fast-food and fruits and vegetables (FV), and media usage at dinner. Children's Healthy Eating Index-2015 scores were calculated using two 24-hour dietary recalls. Trained staff measured percent body fat, weight/height for body mass index (BMI) and BMI z-score calculations. Latent Class Analyses (LCA) and linear regressions (controlled for child/parent age, parent education) were performed.

Results/findings: LCA model fit indices ($G^2=368.96$, $AIC=456.96$, $BIC=577.35$, $Entropy=0.92$) supported a 3-class model. Class 1 (C1) families (21%) filled their children's plates half full of FV less than half the week and watched TV during their infrequent FDs (≤ 3 times/week). Class 2 (C2) families (43%) had FDs 4-6 times/week with no other distinctive characteristics. Class 3 (C3) families (36%) ate daily FDs together without using media. Children and parents in C1 had significantly lower HEI-2015 scores (47.9 ± 2.1 (C1), 50.7 ± 1.5 (C2), 54.4 ± 1.6 (C3), $p=0.04$) and FV intake (2.2 ± 0.6 (C1), 3.2 ± 0.5 (C2), 3.2 ± 0.5 (C3), $p=0.03$), respectively. No class differences in BMI and percent body fat were found, however, child percent body fat was the highest in C1 and lowest in C3 (24.8 ± 1.5 (C1), 22.8 ± 1.1 (C2), 22.0 ± 1.1 (C3), $p=0.31$).

Conclusions: Distinctly different patterns of FD practices suggest a need for tailoring family-meal interventions. C1 families may benefit from more intense interventions that focus on establishing structures/routines for family meals. Interventions for C2 or C3 families should primarily focus on improving quality of foods served.

Patterns of Parenting Practices Regarding Physical Activity Among Parent-Adolescent Dyads

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Special Interest Group: G. Children and families (SIG)

Purpose: Relationships between single parenting practices regarding physical activity and children's body weight and physical activity amounts have been reported. However, parenting practices are not used in isolation and some practices may influence the need for others. Hence, the purpose of this study was to determine patterns of parenting practices regarding physical activity and their associations with body weight, legitimacy of parental authority, and physical activity measures in parents and their adolescent children.

Methods: Dyadic data from the cross-sectional, Internet-based Family Life, Activity, Sun, Health and Eating Study, conducted in 2014 were analyzed using latent class analysis. Parents and adolescents (12-17 years of age) completed demographic, diet, and physical activity surveys. Self-report model covariates included adolescent age and parent and adolescent sex, body mass index category (based on height and weight), moderate-to-vigorous physical activity (MVPA, minutes/day), and legitimacy of parental authority regarding physical activity (PA-LPA).

Results/findings: Based on 1166 parent-adolescent dyads, 4 latent classes were identified representing different levels of practice use – Complete Influencers (26%, reference class), Positive Influencers (23%), Negative Influencers (25%), and Indifferent Influencers (27%). Compared to dyads with parent underweight/healthy weight, dyads with parent overweight/obesity were twice as likely to belong to Indifferent Influencers. Conversely, compared to dyads with adolescent overweight/obesity, dyads with adolescent underweight/healthy weight were twice as likely to belong to Positive and Indifferent Influencers. Compared to dyads with high PA-LPA agreement, dyads with low agreement were 3 to 19 times as likely (parent agreement) and 5 to 28 times as likely (adolescent agreement) to belong to Positive, Negative, and Indifferent Influencers. Decreasing amounts of both parent and adolescent physical activity increased the likelihood of belonging to Negative and Indifferent Influencers.

Conclusions: The findings suggest that parents utilize distinct patterns of physical activity related practices ranging from use of all practices to use of some practices to low use of any practice and these patterns are differentially associated with body weight, PA-LPA, and physical activity. In particular, low use of all practices or use of pressuring in the absence of modeling are associated with less optimal outcomes.

Busier schedules, reduced opportunities for healthy eating among families. Is it that simple? Role of mothers, fathers and adolescents

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Special Interest Group: G. Children and families (SIG)

Purpose: Parents play a critical role in shaping their adolescents' dietary behaviours. Little work has explored how adolescents' transition into secondary school may influence food parenting practices (FPPs) and their subsequent impact on healthy eating. This study explored how household factors facilitated a shift in FPPs as adolescents' transition into secondary school and how this impacted adolescents' dietary habits. Gender-based norms in family food-related responsibilities were also investigated.

Methods: Semi-structured interviews were conducted by trained research staff among 28 families from Canada (67% mothers, 63% 2-parent households). An adolescent (11-13 years) and parent from each family were interviewed separately. Participants were probed for changes in adolescents' dietary environment. All codes were inductively derived, triangulated between 3 researchers and collapsed into higher order themes using a gender lens.

Results: The analysis suggested that adolescents' transition into secondary school is a time of rapid change for families and subsequently, FPPs. Three themes emerged: 1. Busier schedules and healthy eating - More hectic family schedules challenged family meal routines and parents' ability to provide healthy foods. Greater maternal commitments outside of the home were specifically highlighted to increase the instances of families eating out or eating meals on the go; 2. Meal planning for athletic adolescents - Adolescents who participated in structured physical activity programs were encouraged by their parents to consume both energy and nutrient dense foods to optimize athletic performance. In some cases, parents resorted to eating out more often to ensure their athletes were fed before practices; 3. Increased competency, reduced rules and control - Parents reassessed and changed their FPPs as they perceived their adolescents to be becoming more competent in the domain of eating decisions. Mothers predominantly pioneered these family adaptations during adolescents' transition to secondary school.

Conclusions: Greater support for families during adolescents' entry into secondary school may help increase diet quality in busy households. Targeting the FPPs of mothers may have merit as mothers largely bear the food-related responsibilities within the home during the transition. Future work is needed to understand how families can be supported to counteract the trade-off between busier schedules and healthy eating.

**03.26 - Changing behavioral physical activity through opportunities,
routines and strategies,
June 10, 2021**

Climate change, 24-hour movement behaviors, and health: A rapid mini review of systematic reviews

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Special Interest Group: H. Policies and environments (SIG)

Purpose: The worsening climate change and alarming prevalence of communicable and non-communicable diseases continue to threaten human life and existence. Favorable patterns of 24-hour movement behaviors, high physical activity, low sedentary behavior, and adequate sleep, may positively contribute to achieving dual benefits of climate change mitigation and disease prevention. The purposes of this rapid mini review were to summarize the most up-to-date, high-level evidence exploring the relationships between climate change, 24-hour movement behaviors, and health and elaborate on the mechanisms linking the three variables of interest.

Methods: A systematic search of electronic databases was performed in PubMed and Google Scholar during March–October 2020. Inclusion criteria were: (1) systematic review; (2) addressing relationships between climate change, movement behaviors and/or health in any directions; (3) written in English; (4) published between 2010–2020. Narrative synthesis was conducted to highlight the main relationships observed and address the current state of knowledge and priorities for future research. In order to illustrate the potential mechanisms, main results from included systematic reviews were summarized and a conceptual framework was developed for future research.

Results/findings: Based on the evidence from eight systematic reviews published in the past decade, multi-directional (i.e., uni-, bi-, or U-shaped) links were observed between climate change and varying human health outcomes. However, little is understood about the association between climate change and 24-hour movement behaviors. Two reviews suggested the negative impact of climate change on sleep and bi-directional relationships between climate change and physical activity/sport. One review included two studies suggesting the unfavorable impact of climate change on sedentary behavior; however, the evidence was limited. Finally, no reviews examined the mechanisms by which climate change, movement behaviors, and health impact one another. Based on the findings of this rapid mini review, a conceptual framework is proposed that could guide future work to unpack mechanisms between climate change, movement behaviors, and health.

Conclusions: This mini review highlights the importance of better understanding the mechanisms between climate change, movement behaviors, and health to develop effective mitigation and adaptation strategies to climate change while promoting population health through healthy movement behaviors.

A mixed methods evaluation of a school wellness initiative: an examination of longer lunch periods and more physical activity opportunities

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Special Interest Group: H. Policies and environments (SIG)

Purpose: There are currently no national standards for lunch period lengths or physical activity in schools. Research is therefore needed to better understand the impact of school initiatives that improve policies related to lunch and movement opportunities on student outcomes. Additionally, best practices are necessary to support schools that are considering policies that address these factors. The purpose of this study was to examine the impact of a wellness initiative that implemented longer lunch periods, recess, and other movement opportunities on student outcomes and best practices for implementation.

Methods: A mixed methods study was conducted in Anchorage, Alaska (2019-20 school year) using surveys and semi-structured interviews/focus groups. Students' self-reported hunger and mood were assessed using surveys (n=5,107) from students in grades 3-4 attending 19 pilot and 11 matched control elementary schools. Mixed-model ANOVA accounting for student demographics with students as a random effect (students nested within schools) was used to examine differences in hunger/mood. Additionally, perceptions and supportive strategies were examined based on qualitative interviews/focus groups in a representative subsample of 6 pilot schools. A total of 6 school principals, 6 cafeteria staff, 39 teachers (n=6 focus groups) and n=30 parents (n=6 focus groups) were interviewed. Qualitative data were analyzed using principles of content analysis.

Results/Findings. Longer lunch periods (30 minutes vs 20 minutes in control schools) were associated with significantly reduced self-reported hunger at the end of lunch period (mean score 2.65 vs 2.55; p=0.01) and significantly increased happiness in the cafeteria (mean score 3.01 vs 2.86; p=0.03 [max score of 4 reflected a more positive response, e.g. "very full," "more happy"]). Based on interviews/focus groups, the initiative was generally perceived positively with reported benefits including reductions in disciplinary issues and improvements in student focus, social and emotional learning, and overall student happiness and well-being. Several supportive strategies were identified.

Conclusions. Initiatives that increase lunch period lengths and physical activity opportunities have the potential to reduce students' hunger levels and improve focus and behaviors in the classroom. Schools should consider similar initiatives that incorporate the suggested strategies to potentially improve outcomes among students.

Play-friendly communities in Nova Scotia, Canada: a content analysis of physical activity and active transportation strategies

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Special Interest Group: H. Policies and environments (SIG)

Purpose: Communities are important supportive environments for physical activity promotion through their policies and built environments. The Play Friendly Cities framework is a model used to describe key municipal actions and indicators which support a community's playability and can positively influence children's health behaviours and quality of life. The purpose of this study is to assess the playability of communities in Nova Scotia by documenting physical activity and active transportation strategies using the Play Friendly Cities framework.

Methods: Municipal and Mi'kmaq physical activity and active transportation strategies from communities across Nova Scotia were located. Using the Play Friendly Cities framework, strategy content was analyzed based on 20 indicators across four themes: participation of children in decision making, safe and active routes around the community, safe and accessible informal play environments, and evidence-informed design of formal play spaces.

Results: Forty-two plans, including 26 physical activity strategies and 16 active transportation strategies were reviewed. All strategies included statements reflective of at least one indicator (average: 7.2 ± 3.5 , range: 1-15). Content about safe and active routes around the community was most prevalent (40 plans, 416 mentions), while participation of children in decision making was least frequently presented (22 plans, 43 mentions). Content about safe and accessible informal play environments content (29 plans, 105 mentions) and evidence-informed design of formal place spaces (26 plans, 143 mentions) was also presented in the strategies. 'Design streets to safely accommodate all users' was the most frequently reported indicator in active transportation strategies (16 plans, 160 mentions) and 'offer play spaces with loose parts, natural elements, and pop-up adventure activities' was most frequently reported in physical activity strategies (25 plans, 70 mentions).

Conclusions: All physical activity and active transportation strategies in Nova Scotia included some content reflective of a Play Friendly City. However, there is great variability in the number of indicators addressed by the strategies. This summary provides key information on opportunities, such as increasing meaningful involvement of children in decision making, that can inform future municipal actions and policies that aim to support a community's playability.

Changes in BMI and Fitness of Year-round School Children During Primary School: Final outcomes from a natural experiment

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Special Interest Group: H. Policies and environments (SIG)

Purpose: Accelerated body mass index (BMI) gain and cardiorespiratory fitness (CRF) loss during summer (i.e., May-August) compared to the school year (i.e., August-May) is a public health concern for U.S. children (5-12 years) that may be explained by the lack of structured programming during the summer vacation from school. The primary aim of this study was to compare BMI z-score (zBMI) and CRF change during the traditional school year and summer vacation for children attending schools following either a year-round or traditional calendar. Secondary aims were to explore differences by race and by weight status and to estimate growth trajectories from kindergarten-6th grade using the principles of an accelerated cohort.

Methods: Height, weight, and CRF (i.e., FITNESSGRAM PACER Laps) were measured in children (5-12yrs) in 3 schools (two traditional, one year-round, N=2279 students, age=7.9 years SD=2.3, 51.8% male, 64.6% Black) from one school district. Children's zBMI and CRF were measured each May and August from 2017-2019. Mixed effects regression estimated monthly zBMI and CRF change during school and summer for all participants, by weight status, and by race. Using principles of an accelerated cohort, spline regression estimated zBMI and CRF growth from kindergarten-6th grade.

Results/findings: Compared to traditional, year-round school children gained more zBMI monthly (difference=0.015; 95CI=0.002, 0.028) during the school year, but less zBMI (difference=0.834; 95CI=0.575, 1.093) and more CRF (difference=-0.029; 95CI=-0.041, -0.018) during summer. Less monthly zBMI gain during summer for year-round school children compared to traditional school children was observed for children with normal weight (difference=-0.028; 95CI=-0.044, -0.013), overweight (difference=-0.026; 95CI=-0.051, -0.000), and obesity (difference=-0.033; 95CI=-0.049, -0.017). During summer, year-round school Black children had less zBMI gain than Black children at traditional schools (difference=-0.039; 95CI=-0.053, -0.025). This was not observed for children of other races. Spline models estimated similar overall zBMI and CRF change from kindergarten-6th grade for year-round and traditional school children.

Conclusions: Year-round school children gained less zBMI and more CRF during the summer than traditional children. However, during the school year the opposite was true. This pattern was evident for children of all weight statuses and for children who are Black.

Stay Home and Stay Active? The impact of stay-at-home restrictions on physical activity routines in the UK during the COVID-19 pandemic

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Special Interest Group: H. Policies and environments (SIG)

Purpose: To investigate which population groups have reduced or increased physical activity levels during the periods of restrictions put in place during the COVID-19 pandemic.

Methods: We surveyed UK residents, sampled through users of a rewards-for-exercise app (Sweatcoin; n=749) and an online panel (Prolific; n=907). Of the app users, n=487 further provided daily step-count data collected by the app, prior to, and during the periods of restrictions between March and June 2020. Regression models were applied to investigate factors associated with subjective change (perceived change in physical activity) and objective change (log-percentage change in daily step-count) in physical activity during the periods of restrictions. ANOVAs were used to further investigate the significant factors identified.

Results: Perceived change in PA during the first phase of restrictions was, on average, slightly negative ($M=-.30$, $sd=2.67$). However, the distribution of responses was spread widely, highlighting an almost equal split between those who reported a reduction in PA levels (46.0%) and an increase in PA levels (39.9%), with 14.1% reporting no change. Prior to the lockdown periods, mean daily step count across the sample ($N=487$) was 6680.53 ± 3310.24 . Both lockdown phases had a significant negative impact on mean daily step count ($F(1.61, 781.94)=72.838$, $p<.001$), with the mean daily number of steps reducing to a mean of 5157.07 ± 3474.58 in the first phase of restrictions. Key factors associated with a substantial subjective reduction in physical activity included those classed as obese, gym users and people living in urban areas. All participants had a reduced step count during restrictions, with Black, Asian and minority ethnic (BAME) groups, students and urban dwellers showing the largest reductions.

Conclusions: Particularly vulnerable groups to COVID-19, including those classed as obese and BAME groups are further showing substantial reductions in physical activity during the periods of restrictions. Therefore, targeted interventions are required to ensure that the physical and mental health impacts of sedentary behaviour do not exacerbate the risks to these groups.

COVID-19 Lockdowns, Fewer Opportunities to Engage in Sports, Increased Stress Levels Among Adolescents

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Special Interest Group: H. Policies and environments (SIG)

Purpose: The impacts of limiting sports due to COVID-19 lockdowns on adolescents' perceived health have received very little attention since the beginning of the pandemic. This is despite the knowledge that adolescence is a delicate growth period and major life events are usually correlated with psychological and emotional difficulties, and that sports participation is protective and a resiliency factor. This investigation aimed to evaluate if adolescents' lack of sports opportunities (due to COVID-19 policies) were negatively related to their perceived stress, life satisfaction, and self-esteem (i.e., three outcomes).

Methods: Data from time two of an ongoing longitudinal study IPSA (Impact de la Participation Sportive chez les Adolescents) were used for this investigation. In May and June 2020, during the first wave of COVID-19 cases in Québec, Canada, participants (n=228; 63.6% girls; mean age 15.02 years) reported if they engaged in sports before and during the pandemic. Participants responded to the Satisfaction with Life Questionnaire, the Self-Description Questionnaire, and the COVID-19 Peritraumatic Distress Index. Three linear regression models were estimated to assess the effect of change in sport participation on the three outcomes and adjusted for sex.

Results: In May and June 2020, almost half (48%) of participants reported not participating in sports. Boys were more likely to report higher self-esteem ($\beta = 1.59$; 95% CI 0.65-2.53). Participating in sports before the pandemic only and before and during the pandemic (compared to no sports participation at all) were also associated with higher self-esteem ($\beta = 1.44$; 95%CI 0.11-2.77) and ($\beta = 2.12$; 95%CI 0.96-3.28), respectively. Boys were less likely to report distress due to COVID-19 ($\beta = -12.2$; 95%CI -16.3-(-8.4)). Finally, participating in sports before and during the pandemic was associated with higher self-reported life satisfaction ($\beta = 0.74$; 95%CI 0.31-1.17).

Conclusions: Results from this investigation suggest that adolescents who were able to maintain their sports' participation had a greater chance to maintain their general wellbeing. To minimize the impact of generalized confinement on youth, especially on girls, governments should seek to adapt their policy plans to permit minimum access to sports opportunities.

**O3.27 - Adapting to adversity: Insights from motivational variables,
June 10, 2021**

Analyzing Behavior Change Techniques and Dosages: Exemplar from an Optimization Trial of a Physical Activity Intervention for Older Adults (Ready Steady 3.0)

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Special Interest Group: **B. Motivation and behavior change (SIG)**

Purpose: In this project, we analyzed behavior change content within an optimization trial of a physical activity intervention for older adults (Ready Steady 3.0). There are two core intervention components in the trial—a physical activity protocol and monitor--and two experimental components-- sets of interpersonal and intrapersonal behavior change strategies. To analyze intervention content we integrated Behavior Change Technique Taxonomy (BCTT v 1) coding and dosage assessment approaches to address these questions: 1) Which BCTs are used in the core and experimental intervention components? 2) What are the dosages of BCTs used?

Methods: We obtained intervention materials, including scripted manuals with timings, and developed a protocol that tracked BCT codes and dosages. Dosage assessments included the amount (i.e., minutes spent delivering each BCT), frequency (i.e., number of meetings during which each BCT was delivered), and duration (i.e., number of weeks over which each BCT was delivered). We differentiated the amount into three types of prescribed (Rx) action for the participants: receive information about BCTs, practice BCTs during meetings, and BCT implementation after meetings. Two trained researchers independently analyzed intervention materials.

Results: Overall, 28 BCTs are used across the four intervention components. BCTs used most often in the core components are Behavioral practice/ rehearsal, with an amount of 341 minutes, frequency of 8, duration of 8 weeks; and, Self-monitoring with an amount of 8 minutes, frequency of 3, and duration of 6 weeks. The Rx action for each was practice. The interpersonal component's primary BCT codes emphasize social interaction (e.g., Social comparison) with an amount of 116 minutes (26% information; 56% practice; 18% implementation), frequency of 7, and duration of 7 weeks. The intrapersonal component's primary BCT codes emphasize personal thoughts (e.g., Goal setting [outcome]) with an amount of 112 minutes (36% information; 42% practice; 21% implementation), frequency of 7, and duration of 7 weeks.

Conclusions: Our integrated approach to analyzing behavior change content in the Ready Steady 3.0 optimization trial was feasible and provided in-depth details about both which and how BCTs were used. The results will help inform the evaluation of our trial results and future intervention development.

Aging and thriving: The differential roles of physical activity and basic psychological needs

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Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: The purpose of the present study is to determine if physical activity (PA) and self-determination theory's basic psychological needs predict eudaimonic well-being in older adults, and if PA and basic psychological needs interact to predict eudaimonic well-being. Basic psychological needs have not been examined as moderators of the association between physical activity (a potential eudaimonic activity) and eudaimonic well-being among older adults.

Methods: Members of the ALL IN for Health! volunteer registry aged ≥ 55 years, without severe cognitive impairment, were contacted via email to complete five online surveys. At baseline (T1), participants [$N = 430$; mean age (years) = 64.65, $SD = 6.40$] reported on autonomy, competence, and relatedness experienced during PA. To improve the reliability in PA estimates, PA was assessed prospectively using the Physical Activity Scale for Elderly (recall period = 7 days), for four consecutive weeks (T2, T3, T4, T5), and weekly PA scores were averaged. At T5, purpose in life and personal growth were measured according to Ryff's theoretical model of psychological well-being.

Results: Ordinary least squares regression analyses revealed that PA was associated with purpose in life, but only for those reporting low levels of relatedness (average marginal effect, $\Delta_{low} = .23$). Need for competence was more strongly positively associated with purpose in life for those high in relatedness ($\Delta_{high} = .53$) than for those low in relatedness ($\Delta_{low} = .18$; 2nd difference = .36, $p = .02$). Furthermore, PA was associated with personal growth ($b = .02$; $p = .03$), and this effect was not moderated by any of the basic psychological needs. Need for autonomy was positively associated with personal growth, but only for those who also reported high competence. Multiple imputation analyses ($N = 430$) yielded findings and interpretations that were consistent with those from complete cases analysis ($n = 182$).

Conclusions: Both the quantity and quality of PA experiences impact older adult's eudaimonic well-being. In line with self-determination theory, all three needs are necessary to optimize well-being, although they differentially interact with PA. Practically, results suggest that two different, tailored intervention options based on level of relatedness may be advantageous.

The Use of Acceptance- and Mindfulness-based Techniques for Physical Activity Promotion in Breast Cancer Survivors: A Qualitative Study

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Special Interest Group: B. Motivation and behavior change (SIG)

Cancer survivors can face marked internal barriers to physical activity attributable to cancer and its treatment (e.g., fatigue, pain, frustration). This population may benefit from a different approach to physical activity promotion than those featured by traditional interventions. The purpose of this study was to investigate the relevance and potential utility of an electronically delivered acceptance- and mindfulness-based approach to physical activity promotion for insufficiently active breast cancer survivors.

We used the Information Systems Research framework to develop intervention content in an iterative process with input from a convened panel of experts and cohorts of breast cancer survivors. The intervention consisted of audiovisual didactic content, experiential exercises, and electronic workbook-type activities that targeted principles and processes in Acceptance and Commitment Therapy. All intervention content was delivered to participants electronically via a secure, automated survey system (i.e., web pages) over the course of 4-8 weeks. We administered the System Usability Scale (SUS) and conducted individual interviews with participants after they experienced the intervention content. Interview proceedings were professionally transcribed, and three coders conducted thematic content analysis on the transcripts. Of 30 recruited participants, 18 completed the SUS and 16 participated in an in-depth interview. The mean age of the sample was 58.4 years (SD = 13.8); the sample was relatively well-educated, mostly non-Hispanic white, and mostly overweight or obese. Results indicated high usability of intervention content (mean SUS score = 80.0, SD = 18.2). We identified three overarching themes from individual interviews. These were 1) barriers to physical activity adherence (subthemes: physical, psychological barriers), 2) the use of acceptance- and mindfulness-based techniques for physical activity promotion (acceptance, contact with the present moment, values, goal setting), and 3) digital behavior change intervention-related considerations (e.g., usability, usage patterns, participant burden, graphical design). Overall, intervention content was perceived to be relevant, uniquely empowering, and to fulfill important needs related to healthy living.

Electronically delivered acceptance- and mindfulness-based approaches hold promise for helping insufficiently active breast cancer survivors increase physical activity. Further research regarding the acceptability and potential efficacy of interventions that combine techniques from the field of psychotherapy with digital technologies is warranted.

A mixed methods study exploring rural-living young adult cancer survivors' motivation during a telehealth behaviour change intervention

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Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: Telehealth interventions may offer a solution to the unique barriers that rural living presents to the delivery of health behaviour change interventions while simultaneously addressing the preferences of young adult cancer survivors (YACS). Although the effectiveness of online and mobile technologies for supporting behaviour change is growing, it remains unclear whether interventions delivered using teleconferencing technology can support YACS' motivation for behaviour change. The purpose of this study was to deliver a telehealth intervention to rural-living YACS and explore their physical activity (PA) levels, fruit and vegetable (FV) consumption, and the motivational processes underlying any behaviour changes.

Methods: The intervention was grounded in self-determination theory and embedded behaviour change techniques and motivational interviewing principles. Participants met with a health coach once a week for 60 minutes for 12 weeks. A concurrent triangulation design was used, wherein quantitative and qualitative data were collected and analyzed concurrently. Participants completed pre- and post-intervention surveys and a post-intervention interview. Survey data, used to describe the magnitude of differences in variables pre- to post-intervention, were analyzed using Wilcoxon matched-pairs signed rank tests. Interview data, used to explore the underlying mechanisms supporting behaviour change, were analyzed deductively using thematic analysis employing a self-determination theory lens.

Results/Findings: For the quantitative results, large effect sizes were observed for PA and FV consumption ($r_s=.63$), perceptions of autonomy, competence, and relatedness related to PA and FV consumption ($r_s=.43-.63$), and autonomous motivation for PA and FV consumption ($r_s=.51-.54$). Medium effect sizes were observed for controlling motivation for PA and FV consumption ($r_s=.31-.34$). For the qualitative findings, five themes were created: (1) connecting with the health coach in an autonomy supportive environment; (2) developing capacity to have positive connections with others; (3) developing competence by autonomously mastering challenging tasks; (4) being in control of decisions promotes perceptions of autonomy, and; (5) motivation for behaviour change is dynamic and complex.

Conclusions: Results were aligned, suggesting motivation for behaviour change can be facilitated by one-on-one, synchronous sessions delivered via teleconferencing technology. Further, findings underscore the need to think beyond intervention content and consider interpersonal style when communicating behaviour change techniques to participants.

The experiences of adapting physical activity routines during the COVID-19 pandemic: A qualitative study

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Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: Recent studies suggest that the COVID-19 pandemic and related public health restrictions have resulted in changes in physical activity and sedentary behaviour. Qualitative studies exploring this phenomenon in depth are lacking. The purpose of this study was: 1) to explore the lived experiences of adults adapting their physical activity and sedentary behaviour during the COVID-19 pandemic; and 2) to describe impacts of COVID-19 on perceptions of health in relation to changes in physical activity and sedentary behaviour.

Methods: The study was undertaken in Calgary (Canada). Using a constructivist grounded theory methodology, semi-structured interviews were undertaken with 12 adults (50% female; 20-70 years old) from June to October 2020. A maximum variation sampling strategy to select participants was used to ensure diversity in the sample. Participants differed based on their sociodemographic characteristics, physical activity levels, and perceived seriousness and anxiety related to the COVID-19 pandemic. Interviews were conducted via telephone or video conferencing and focused on exploring experiences with physical activity and perceptions of health during the pandemic. Data were collected until saturation and thematic analysis undertaken.

Results: Four overarching themes were identified: 1) Disruption to Daily Routines; 2) Changes in Physical Activity; 3) Health Balancing, and; 4) Family Life. Many participants described how the pandemic has led to extensive change and disruption in their lives. Participants reported on facilitators and barriers they encountered in adapting their physical routines, including challenges related to the closure of recreation and fitness facilities. Negative mental health impacts, including anxiety and social isolation were also experienced by participants. Unexpectedly, some participants reflected on the positive opportunities COVID-19 had brought, including an enhanced feeling of balance in their lives.

Conclusions: Participants reported positive and negative impacts on physical activity due to the pandemic. Providing outdoor opportunities during public health restrictions because of recreational facility closures may be a viable strategy for maintaining adult's regular physical activity during a pandemic. Supporting individuals with finding physical activities they find intrinsically enjoyable can support the adoption and adaptation process while improving mental well-being.

Barriers and facilitators to a healthy lifestyle using the COM-B model: perspective of postpartum women

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Special Interest Group: E. Implementation and scalability (SIG)

Purpose Postpartum weight retention is a significant contributor to weight gain and obesity in women of reproductive age. Achieving and maintaining a healthy lifestyle during this period could be challenging. This study aimed to synthesise the barriers and facilitators to engaging in a healthy lifestyle during the first two years postpartum using the Capability, Opportunity, Motivation and Behaviour (COM-B) model.

Methods Women who have given birth within the last two years and currently living with the child were recruited through convenience and snowball sampling to complete an interview (30-40 mins) via Zoom. Informed consent was obtained at the start of the interviews. Interviews were audio-recorded and transcribed using a professional transcription service. All interview transcripts were coded by one author (MS), with a 10% subset independently coded by other authors (SL, LM). Thematic analysis were conducted using an open coding approach. The main themes were subsequently mapped to the COM-B domains.

Results A total of 21 postpartum women (mean age 37+10 years) completed the interviews. Of the facilitators, the main Capability was the ability to organise, plan and prioritise for healthy eating and exercise, mental well-being and sufficient sleep. The greatest source of Opportunity was that provided by partners, extended family and friends through practical and motivational support for healthy lifestyle. In addition, residential location was also an important factor in Opportunity for physical activity. Constructive self-talk and finding exercise that appeals were factors relating to Motivation that facilitates healthy lifestyle. Of the barriers, limitations in Capability included physical recovery from childbirth, sleep deprivation and reduced energy. Barriers in Opportunity included reduced income during maternity break and lack of social support for practical help. Barriers in Motivation included a lack of motivation and competing priorities from child's needs.

Conclusions This study summarised the key barriers and facilitators in terms of capability, opportunity and motivation for healthy lifestyle behaviours in postpartum women. Our findings suggest that postpartum lifestyle interventions should focus on organisational and planning skills, involve partners or extended families or friends, address infant and mother sleep issues, tailor exercise to women's preference and include positive self-talk.

**03.28 - Advances in screen time and sedentary behavior youth-based research,
June 10, 2021**

Identifying Effective Intervention Strategies to Reduce Children's Screen Time: A Systematic Review and Meta-Analysis

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Special Interest Group: G. Children and families (SIG)

Background: Excessive screen time (>2 hours/day) is associated with childhood overweight and obesity and unfavorable obesogenic behaviors such as physical inactivity, sedentary time, and disrupted sleep. Prior reviews indicate intervening on screen time leads to improvements in screen time and other obesogenic behaviors; yet it is unclear what behavioral strategies and intervention characteristics are most important to consider in the design of screen time interventions.

Purpose: A systematic review and meta-analysis was conducted to identify behavioral strategies and intervention characteristics associated with treatment effectiveness in behavioral interventions targeting reductions in children's screen time.

Methods: A computer-based search strategy employing keyword and controlled vocabulary terms with four databases (Web of Science, EMBASE, Ebscohost, Pubmed) was executed during January-February 2020. Behavioral interventions targeting reductions in children's (0-18 years) screen time were eligible for inclusion. Intervention characteristics (e.g., sample size, duration) and the type of behavioral strategies used (e.g., education, social support, goal-setting, or accountability) were extracted.

Results: 11,949 articles were reviewed for inclusion based on title/abstract of which 595 underwent full-text review. Of these, 216 underwent narrative extraction and 186 were included in the random-effects meta-analysis. The overall standardized mean difference (SMD) was 0.12 (95%CI 0.08 to 0.16), suggesting small improvements in children's screen time. Across all studies, incorporating goal strategies was associated with larger effects (SMD=0.18, 0.13 to 0.23) vs. studies without these strategies (SMD=0.04, -0.02 to 0.10). No other strategies were associated with intervention effectiveness. Accounting for sample size, goal-setting strategies were most effective in small studies (N<95, SMD=0.31, 0.22 to 0.41) with this effect dissipating with progressively larger studies (N>697, SMD=0.08, -0.02 to 0.17). In the absence of goal-setting strategies, effectiveness was associated with sample size (N<95 SMD=0.20, 0.01 to 0.40; N>697 SMD=0.06, -0.05 to 0.16).

Conclusions: Goal-setting strategies result in greater reductions in children's screen time. However, this impact is predominately driven by smaller studies. As sample size increased, studies incorporating goal strategies were no more effective than those studies that did not. Identifying ways to maintain the effectiveness of promising behavioral strategies identified in small trials when scaled are needed.

The Effects of a Previous Night's Sleep on Children's Next-Day Screen Time

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Background: Screen time (ST) is known to disrupt children's sleep duration and timing, both acutely and chronically. However, few studies have examined the reverse effect of sleep on subsequent ST, particularly in elementary-aged children. Insufficient sleep may contribute to next-day fatigue and predispose children toward engaging in less energy-demanding activities, such as ST. Children's sleep may be regulated by household routines, bedtime rules, and structured activities. On less-structured days (e.g., weekends), children may modify their behaviors, by sleeping longer, shifting their bed and wake times later, and engaging in sedentary leisure-time activities, such as increased ST. This study examined the temporal association between children's sleep duration and next-day ST.

Methods: Parents of 200 children (6-12 years, 50% female, 36% white) reported their child's daily bedtime, wake time, and total ST over 5 waves of 30-day data collection sprints between 2018-2019. Sleep duration was calculated as the difference between children's wake time and previous bedtime. A multilevel linear mixed model (observations nested within children) was used to estimate total ST from the previous night's sleep duration, accounting for time in the study, day of week, gender, age, and race. Sleep duration was mean-centered to estimate between- and within-child effects.

Results: On average, children had more total ST ($B=20.1$ minutes, 95%CI 12.9, 27.3) on weekends compared to weekdays. Within-subjects effects revealed that on nights when children slept an hour longer than usual, their total ST the following day was 6.6 minutes (95%CI 3.7, 9.5) higher than their usual total ST. Between-person effects showed that on average, children who slept the longest did not have significantly more total ST than their peers ($B=-8.7$, 95%CI -18.6, 1.2).

Conclusions: While previous research has linked ST to subsequent disrupted sleep, this study explored the reverse relationship and found children had more ST following nights of longer sleep, even after accounting for day of week. Future analyses should explore the link between increased sleep duration and next-day ST on weekdays versus weekend days during the school year and summer. Further, the regulatory effects of parental rules and routines for bedtime on children's sleep and ST is warranted.

Elementary School Children Increased Total Screen Time During the COVID-19 Pandemic at a Greater Rate than Preceding Years

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Background: Approximately 1.5 billion elementary-age children were impacted by school closures and began virtual learning due to the COVID-19 pandemic during March/April 2020. Cross-sectional and retrospective longitudinal studies indicate that children's screen time increased during the pandemic. However, they do not account for expected maturation changes. This Interrupted time-series design compares changes in children's screen time from 2019-2020 (Pandemic) to changes from 2018-2019.

Methods: Parents of 231 elementary school students (ages 7-12) from a larger cohort reported children's total screen time, evening screen time (after 8:00pm), and bedroom screen time (after 8:00pm in the bedroom) on 2-3 random days each week for 6 weeks in the Spring (April/May) and Summer (June/July) from 2018-2020. Three multilevel mixed models were used to estimate differences in means and changes in slope between years, accounting for age, sex, and race.

Results: Prior to the pandemic (2018-2019), all screen time categories increased during both spring [total (B=22.05, 95%CI (9.84, 34.27), evening (B=19.18, 95%CI (12.50, 25.85), bedroom (B=6.76, 95%CI (1.54, 11.98))] and summer [total (B=30.67, 95%CI (19.39, 41.95), evening (B=20.85, 95%CI (14.68, 27.02), bedroom (B=8.60, 95%CI (3.77, 13.43))]. During the pandemic, a significant acceleration occurred from 2019-2020 compared to 2018-2019 for total screen time during the spring (B=97.21, 95%CI (79.00, 115.43), and summer (B=18.27, 95%CI (1.12, 35.41), accounting for 97.2 ± 9.3 and 18.3 ± 8.8 additional minutes of screen time, respectively. However, accelerated changes in evening and bedroom screen time were not detected during the pandemic compared to the rate of change from 2018-2019 during the spring [evening (B=9.74, 95%CI (-0.03, 19.52), bedroom (B=3.92, 95%CI (-3.71, 11.55))] or the summer [evening (B=-7.05, 95%CI (-16.37, 2.28), bedroom (B=3.90, 95%CI (-3.39, 11.19))].

Conclusions: Virtual learning likely contributed to the observed increase in total springtime screen use during the pandemic. However, continued elevated screen use in summertime is concerning. It appears that screen time patterns established in the spring persisted into the summer, even in the absence of virtual learning. This study did not differentiate between academic and non-academic screen use; future studies are needed to evaluate if academic screen time differentially impacts health outcomes.

Screen Time Parenting Self-Efficacy, Screen Time Exposure, and Sleep among Latinx Children

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Purpose: Poor sleep quality during childhood is associated with obesity and other chronic diseases. Further exploration of the association between screen time exposure (particularly before bedtime) and poor sleep is needed. In addition, parenting practices are an important determinant of children's health, and psychosocial predictors such as parental self-efficacy impact parenting behavior and child health outcomes per recent research. Considering that Latinx children have the highest prevalence of obesity in the United States and that Latinx families may have increased exposure to screen time, this study aims to examine the association between screen time parenting self-efficacy, screen time exposure, sleep among Latinx children.

Methods: This was a cross-sectional study with 101 Latinx parents of 2-to-5-year old children. Parents completed a survey (in-person and online) that measured: (1) Screen time parenting self-efficacy (adapted from a validated questionnaire) (2) Screen time in the hour before bedtime across devices (e.g. television and mobile media devices – binary "Yes/No"), and (3) Parent-reported child sleep duration. Analysis approaches include logistic regression, ANOVA, and hierarchical linear regression controlling for covariates.

Results/Findings: Children averaged 46 months of age (SD = 13), 49% were girls, and 44% were overweight/obese. Our main findings were: (1) Higher screen time parenting self-efficacy was associated with lower odds of exposure to: (a) mobile media devices ($\text{Exp}(B) = .635$, $p = .023$), (b) video games ($\text{Exp}(B) = .534$, $p = .009$), (c) PC/laptops ($\text{Exp}(B) = .590$, $p = .021$) in the hour before bedtime. (2) Children exposed to (i) video games, (ii) PC/laptops, (iii) mobile media devices, and (iv) TV in the hour before bedtime had significantly lower average daily sleep duration (range of p from $<.001$ to $= .044$). (3) screen time parenting self-efficacy accounted for child sleep duration above and beyond the effects of screen time exposure across different devices (range of p from $.006$ to $.017$).

Conclusions: Lower screen time parenting self-efficacy and screen time exposures before bed were associated with lower sleep duration among our sample of Latinx children. Further research examining screen time parenting and exposure among Latinx children are needed.

Development of an automated, objective assessment of children's TV viewing: FLASH-TV

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Purpose: Excessive TV-viewing among children is a public health concern, yet tools to measure children's TV viewing suffer from biases. Our goal was to develop FLASH-TV, an objective measure of children's TV viewing using computer vision and machine learning algorithms to analyze video images of the child in front of a TV.

Methods: Four design studies were done with family triads (parent and 2 siblings). Three were in an observation lab and 1 in the child's home. The FLASH-TV system included a video camera placed near the TV facing the room in front of the TV. As a gold standard, video data were coded by staff using duration coding at the frame level (~30 frames/sec) for whether the target child's gaze was on the TV (10% double coded, mean Kappa 0.83-0.88). FLASH-TV estimates a child's TV viewing time by first detecting faces in a frame, next verifying that the face is the target child, and last assessing TV-watching (gaze) behavior. Each step is based on modifications of convolutional neural network algorithms. The target child's TV viewing time estimated by FLASH-TV running the three steps sequentially was compared to the gold standard. Criterion validity for overall TV viewing time and frame-by-frame gaze between FLASH-TV and gold standard was calculated using intra-class correlation (ICC) in a generalized linear mixed model framework.

Results: 21 parent-sibling triads participated in one of 4 design studies. The children's mean age was 10.2 years, with 38.1% non-Hispanic white, 28.6% black, 19% Hispanic white, and 14.4% other. The ICC was 0.725 when comparing the child's gold standard TV viewing time (min:sec/child) to FLASH-TV estimated time. The ICC for gaze/no gaze at the frame level (15-30 frames/sec) by FLASH-TV to the gold standard was 0.401.

Conclusions: FLASH-TV offers a critical step forward in improving the accuracy of assessment of children's TV viewing time. A lower ICC at the frame level compared to aggregated time indicates reliability across families and smoothing between activities needs to be improved. Once optimized, FLASH-TV can be used in surveillance and intervention studies to more precisely measure children's TV viewing.

Sedentary behaviors and shapes of subcortical brain structures in children with overweight/obesity: the ActiveBrains Project

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Special Interest Group: G. Children and families (SIG)

Purpose: Sedentary behaviors are considered the fourth greatest factor of mortality worldwide. Specifically, screen media use is the most popular leisure-time sedentary behavior among children and adolescents. It is, however, unknown how these sedentary behaviors relate to shapes of subcortical brain nuclei. We aimed to examine the association of sedentary behaviors (i.e., watching TV and playing video game, and total sedentary time) with the shapes of subcortical brain structures (i.e., hippocampus, accumbens, amygdala, caudate, pallidum, putamen, and thalamus) of children with overweight/obesity.

Methods: The present cross-sectional analyses used baseline data from 99 children with overweight/obesity (10.0 ± 1.1 years; 60% boys) from the ActiveBrains project. Sedentary behavior was measured using the Youth Activity Profile-Spain (YAP-S) questionnaire, an adapted version of the original YAP. The shape of subcortical brain structures was assessed by magnetic resonance imaging, and its relationship with sedentary behaviors was examined after controlling for a set of potential confounders using a partial correlation permutation approach.

Results/findings: Our results showed that watching TV, playing video games and total sedentary time were selectively related to expansions and contractions of shapes of subcortical brain nuclei. Specifically, higher time spent watching TV was related to contractions in certain regions of the accumbens and pallidum (K ranging from 179 to 411; $p < 0.05$), while higher time spent playing video games was related to both expansions and contractions in certain regions of the hippocampus, caudate, pallidum, and thalamus (K ranging from 90 to 459; $p < 0.05$). Total sedentary time was mainly associated with contractions in caudate regions (K= 266). However, none sedentary behavior examined was associated with the amygdala ($p > 0.05$).

Conclusions: Sedentary behaviors may influence the shapes of subcortical brain structures in children with overweight/obesity. While watching TV and total sedentary time were related to contractions in basal ganglia subregions, video games were related to both expansions and contractions in certain subcortical regions. Future larger studies should confirm or contrast our findings, and shed light on its cognitive implications during childhood.

**O3.29 - Diet and physical activity measures for different target groups,
June 10, 2021**

Measures for children at high risk for obesity: Choosing whether to apply, adapt, or develop a measure for my research population

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Special Interest Group: J. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

Purpose: Accurate, culturally and linguistically appropriate measures are important for research and addressing health disparities. In 2013, the Institute of Medicine concluded only 1 in 5 measures were specifically developed or adapted for children and their families at high risk for obesity. Literature suggests three ways to use measures in high-risk populations: apply or adapt an existing instrument or develop a new instrument. Little guidance exists on when each approach is best. To assist researchers and practitioners in accurately measuring high-risk populations, this abstract describes a new resource the National Collaborative on Childhood Obesity Research (NCCOR) created to address this gap.

Methods: NCCOR screened references in NCCOR's Measures Registry, a searchable database of 1,400 individual and environmental dietary and physical activity measures relevant to childhood obesity research, from January 2013 to September 2017 (n=351) and abstracted information of 38 individual and environmental measures developed for, adapted for, or applied to high-risk populations or settings. Abstraction included, measure type, study population, adaptation and validation methods, and psychometric properties. Next, NCCOR compiled methods and considerations for adapting and validating measures among high-risk populations from systematic reviews. Finally, NCCOR hosted a workshop on the topic in 2019 to develop guidance and recommendations.

Results/Findings: As a result, NCCOR developed a decision tree to walk users through a series of questions regarding whether to develop, adapt, or apply an instrument for obesity measures in high-risk populations. Examples of topics covered include how to involve community stakeholders, determine whether populations are meaningfully different, and determine whether modifications to instruments require revalidation. The decision tree also provides 5 real-world case scenarios that describe the rationale for choosing a measurement approach.

Conclusions: This project fills a research gap that will help researchers and practitioners determine which measures to apply, adapt, or develop when assessing children and families at high risk for obesity. This resource will help to promote rigorous strategies for measuring high-risk populations which will allow for more standardization across the field. We hope this freely available resource encourages the development of sound measures to use in high-risk populations and increase adoption of these strategies.

Validity of an infant tummy time questionnaire and time-use diary against the GENEActiv accelerometer

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Special Interest Group: J. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

Purpose: Tummy time is an important form of physical activity for infants, and along with the inclusion of this behaviour in recent guidelines, research on tummy time is growing. Most epidemiological studies have assessed tummy time using subjective measures, though none of these measures have been tested for validity. As such, this study examined the concurrent validity of a tummy time questionnaire and time-use diary against a validated accelerometer measure.

Methods: Participants were 29 parents and their 6-month-old infants from the Early Movers project in Edmonton, Canada. Tummy time was concurrently measured using a parental questionnaire, a 3 day/night time-use diary, and a previously validated GENEActiv accelerometer. In participants with complete data on all measures (n=26), relative concurrent validity was examined using Spearman's rank correlations. Absolute concurrent validity was examined using Wilcoxon signed-rank tests and Bland-Altman plots.

Results: Median tummy times assessed by the questionnaire, time-use diary, and accelerometer were 96min/d, 56min/d, and 54min/d, respectively. Both the questionnaire ($r_s=0.60, p=0.001$) and time-use diary ($r_s=0.80, p<0.001$) measures of tummy time were significantly correlated with the accelerometer measure. Compared to the accelerometer measure, the questionnaire measure had a significantly higher mean rank of tummy time ($p=0.001$), however, no significant differences were observed for the time-use diary measure ($p=0.829$). Bland-Altman plots showed a significant mean difference in tummy time for the questionnaire measure (vs. accelerometer measure: 42min/d; 95% limits of agreement: -73, 157min/d) but not for the time-use diary measure (vs. accelerometer measure: 2 min/d; 95% limits of agreement: -47, 51min/d). In both plots, low variance of individual-level differences was observed below 30min/d and higher variance was observed above 30min/d.

Conclusions: Large effect sizes ($r>0.50$) were observed for relative concurrent validity of the tummy time questionnaire and time-use diary compared to the accelerometer measure. Therefore, these subjective measures appear most appropriate for infant studies examining associations with tummy time and/or comparing tummy time between samples. For absolute concurrent validity, the questionnaire tended to overestimate tummy time compared to the

accelerometer. However, the time-use diary may provide a relatively precise estimate of tummy time in prevalence studies among infants.

Associations between the childcare environment and children's in-care physical activity and sedentary time

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Special Interest Group: F. Early care and education (SIG)

Purpose: Childcare centers are important for children's behaviors. This study aimed to examine the cross-sectional associations between structure and processes quality of the childcare environment and physical activity and sedentary time in children.

Methods: Participants were 124 toddlers and 118 preschoolers from 19 centers in Alberta and Ontario, Canada in the supporting Healthy physical AcTive Childcare setting (HATCH) study. In-care physical activity and sedentary time were assessed using Actigraph accelerometers. Childcare environments, including structure (e.g., resources) and process (e.g., activities) quality, were measured using three instruments: (i) Environment and Policy Assessment and Observation and (ii) the Children's Physical Environments Rating Scale, and (iii) Movement Environment Rating Scale. Mixed models were performed to examine the associations between environmental characteristics and children's sedentary time, light physical activity and moderate-to-vigorous physical activity (MVPA).

Results: For toddlers, a few structure quality characteristics related to childcare policy (i.e., "screen time policy", "outdoor play and learning policy") and indoor environment (i.e., "modified open-plan space") were associated with higher physical activity and lower sedentary time. For preschoolers, the overall structure quality ($B=0.04$; $95\%CI:0.003,0.08$) and process quality ($B=0.08$; $95\%CI:0.02,0.15$) of the childcare environment were associated with log MVPA. In particular, structure quality characteristics of the outdoor environment (i.e., "outdoor play time", "outdoor play and learning education and professional development", "play yard providing functional needs", "play yards providing developmental needs") and physical activity time were generally shown to be associated with higher physical activity and lower sedentary time. Similar associations were also observed for process quality characteristics: "curriculum, environment, and resources for physical development" and "pedagogy for physical development".

Discussion and Conclusions: Enhancing structure quality related to childcare policy and the indoor environment seems promising in promoting physical activity and less sedentary time in childcare for toddlers. For preschoolers, overall structure quality of the environment, in particular the outdoor environment, and overall process quality of the environment, in particular curriculum and pedagogy, appear important for physical activity and sedentary time. Given the different pattern of associations observed between toddlers and preschoolers, stratified analysis is recommended for future research in this area.

Towards more personalised digital health interventions: a clustering method of action and coping plans to promote physical activity

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Special Interest Group: J. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

Purpose: Despite effectiveness of action and coping planning in previous digital health interventions to promote PA, attrition rates in such interventions remained high. Indeed, support to make plans is often abstract, generic and the same for each individual. Nevertheless, people are different, and context varies between individuals. Tailored support at the operational level, involving suggestions of specific plans that are personalised to the individual, is needed. The aim of this study was to identify user types that relate to specific action and coping plans using clustering algorithms, in order to provide personalised suggestions in a later phase.

Methods: Data of 59 healthy adults, including 222 action plans and 204 coping plans, were used for this study and were collected as part of a digital health intervention to promote physical activity. Clusters of action plans, and clusters of combinations of action plans and barriers of coping plans were identified using hierarchical clustering. Associations with specific user information (i.e. gender, age, intention, etc) were examined using chi2 –tests and analyses of variance.

Findings: Three clusters of action plans were identified, each characterized by different aspects. Cluster 1 was characterized by outdoor activities (walking, biking and running) which could be performed on every day of the week. Cluster 2 by household activities which mainly took place on Saturdays. Cluster 3 by active transport and different sport activities (swimming, fitness, etc) which mainly took place in the evening. Cluster 1 could be associated to a higher BMI, cluster 2 to women and users that didn't perform PA regularly, and cluster 3 to younger adults. Furthermore, eight clusters of combinations of action plans and barriers of coping plans were identified (e.g. cluster 4 was characterized by outdoor activities on weekdays with bad weather as a barrier). Here, associations with user information were not straightforward.

Conclusions: Some associations of action plans with user information were found, however user types that relate to specific action plans and coping plans could not be identified. To conclude, other strategies are needed to provide personalised suggestions, notwithstanding that associations found in this study can be used as a starting point.

Development of a food literacy and physical activity intervention to optimize metabolic health among women of reproductive age in urban Uganda

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Special Interest Group: J. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

Purpose: Over the last two decades, metabolic health of urban Ugandans, mostly women has increasingly become suboptimal. As women are strategic for family behavioural change and as their dietary and physical activity (PA) patterns do not align with WHO recommendations, there is an urgent need for science-based interventions allowing to tackle these unhealthy dietary and PA behaviors.

Objective: To develop a food literacy and PA intervention optimising metabolic health among women of reproductive age in urban Uganda.

Methodology: Steps 1-4 of the intervention mapping protocol were used to design the intervention.

Results: Notable determinants from Step 1 are socio-cultural misconceptions around PA, fruits and vegetables, and gaps in knowledge, skills, self-efficacy and nutrition information evaluation. Due to the complexity of the determinants, we decided to go for gradual changes rather than changing the overall existing behaviours towards WHO healthy guidelines in one intervention. Hence in step 2, three behavioural intervention objectives were formulated to increase; 1) women's ability to evaluate nutrition information, 2) fruit and vegetables consumption, and 3) engagement in moderate PA. Performance objectives and matrices of change objectives were formulated for each intervention objective. In step 3; motivational interviewing, information, skills training, goal setting, role modelling, feedback and social support through exchanging ideas were selected and translated into practical strategies. In step 4, an intervention consisting of five interactive group sessions was developed. Sessions are: i) benefits of PA and healthy diet, healthy recommendations, and personal health risk assessment; ii) planning and setting personal weekly PA, fruit and vegetable goals; iii) Evaluation of nutrition information and vegetable preparation techniques; iv) review and adaptation of goals; v) review and adaptation of goals. A booklet of vegetable recipes and practical tips is provided. The intervention is currently being evaluated through a cluster-randomized controlled trial (<https://clinicaltrials.gov/ct2/show/NCT04635332>). By the time of the conference, preliminary results will be presented.

Conclusion: The intervention is novel as personal goals are linked to personal metabolic health profile. If the intervention is effective, a well-developed intervention will become available for reference in urban Uganda.

**03.30 - Promoting physical activity and nutrition in under 5s in and out
of childcare,
June 10, 2021**

A Systematic Review and Meta-Analysis of Infants' and Toddlers' Accelerometry-Measured Physical Activity and Sedentary Time Across Daytime Hours

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Special Interest Group: F. Early care and education (SIG)

Purpose: Physical activity (PA) participation in early childhood is important to shape healthy movement behaviours across the lifespan; therefore, it is essential that PA is promoted from infancy, and that poor health behaviours (e.g., prolonged sedentary time [ST]) are minimized. This review and meta-analysis examined infants' and toddlers' movement behaviours across daytime hours.

Methods: We searched seven electronic databases for terms relating to infants (<12 months), toddlers (12-35.9 months), PA, ST, and accelerometry. A total of 4,873 articles were examined by two independent reviewers for English-language, peer-reviewed original research, that reported infants' (counts/min) and/or toddlers' (min/day) accelerometry-measured PA or ST across daytime hours. Mean PA level (counts/min) for infants was calculated across studies, and ranges were produced. Toddlers' movement behaviour estimates were aggregated meta-analytically to produce mean daily rates; moderating variables (accelerometer placement, cut-point validity, device type, and epoch length) were explored.

Results: Twenty-four articles from 16 countries (published 2011-2019; n = 3,699 participants) were included in the systematic review. Across 5 studies, infants' mean PA level was 1,494.4 counts/min (range: 78.2 to 2580.5). Across 20 studies, toddlers' PA (total, light, moderate-to-vigorous) and ST ranged from 72.9 to 636.5, 48.5 to 582.4, 6.5 to 89.9, and 172.7 to 545.0 min/day, respectively. After accounting for moderating variables, meta-analyses showed toddlers engaged in 246.2 min/day (SE = 28.5; 95% CI: 190.3, 302.0) of total PA, 194.1 min/day (SE = 28.8; 95% CI: 137.7, 250.5) of light PA, 60.2 min/day (SE = 5.9; 95% CI: 48.6, 71.7) of moderate-to-vigorous PA, and 337.0 min/day (SE = 32.7; 95% CI: 273.0, 401.1) of ST.

Conclusions: With limited studies conducted in infants, and lack of cut-points and use of body positioning devices to detect tummy time, PA estimates are inconclusive and lack interpretability. Overall, toddlers reported to exceed the total PA guideline (180 min/day); yet, little of this time is spent at higher intensities. Despite high PA rates, toddlers still engage in substantial ST. Consistency in the application of valid measurement protocols is needed to allow for greater comparability across studies.

Nutrition Environment and Meal Quality in Family Child Care Homes: Happy Healthy Homes Baseline

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Special Interest Group: F. Early care and education (SIG)

Purpose: Provide a description of the nutrition environments, including provider nutrition environment, and foods served and consumed in Family Child Care Homes (FCCH).

Methods: FCCH providers (n=51) within a 60-mile radius of Oklahoma City who care for at least one 2-to-5 year old child and participate in the Child and Adult Care Food Program (CACFP) were invited to participate in a randomized matched-attention controlled trial (Happy Healthy Homes). FCCH observations were conducted over two, non-consecutive days, averaged for analyses. Nutrition environment was scored using a modified Environment Policy and Assessment Observation (i.e. EPAO) for FCCH. Foods served and child dietary intake for 2-to-5 year old children was observed using the dietary observation in child care (DOCC) protocol. Meal kilocalories and MyPlate serving sizes were determined using Food Processor. Variety was quantified by the total number of exposures to food (fruits, vegetable, high sugar and high fat foods, and whole grains) served and consumed over the two visits. Child and Adults Care Food Program (CACFP) requirement and best practice compliance was determined using a measurement index.

Results/Findings: Providers were 44.2 ± 14.2 years of age, cared for 9.5 ± 4.2 children, and had 1.4 ± 1.4 additional staff. Total nutrition environment score was 11.7 ± 1.2 (max 19). During lunch, children were served 387.0 ± 137.8 kilocalories, and consumed 269.1 ± 124.8 (daily age-and-activity-based recommendation is 1000-1600 kilocalories). Children were served and consumed less than 1/3 of the MyPlate food group recommendations with the exception of dairy. Children were exposed to an average of 1.7 vegetables, 1.3 fruit, 1.3 high fat foods, 0.5 whole grains, and 0.03 high sugar foods during lunch. Providers met more of the requirements (82% of maximum score) component of CACFP compared to the best practices (51% of maximum points) and food preparation methods (45% of maximum score).

Conclusions: While CACFP compliance was high, service of volumes sufficient to meet MyPlate recommendations was low for all food groups, except dairy. Compliance with CACFP best practices was low. Continued efforts are needed to understand the ECE nutrition environment and enhance nutritional quality of foods provided to children.

Sedentary Behaviour, Physical Activity, and Step Count in Preschoolers During COVID-19: A Pre-Pandemic Comparison

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Special Interest Group: F. Early care and education (SIG)

Purpose: Many preschoolers spend a significant amount of time in child care, an environment that is influential in the early development of sedentary and physical activity behaviours that track across the lifespan. In response to the COVID pandemic, early childhood education and care (ECEC) programs follow government-mandated guidelines to prevent virus transmission. These guidelines include restrictions on access to shared spaces and physical distancing recommendations. The purpose of this study was to explore the impact of COVID guidelines in the ECEC setting on sedentary behaviour, physical activity time, and step count among preschoolers in child care.

Methods: This time-series cross-sectional study compared 238 preschoolers (3-5 years) from licensed child care programs in Alberta, Canada. Data collection occurred pre-COVID in Fall 2019 (N=143, 51.0% female, 4.3 ± 0.7 years) and during COVID in Fall 2020 (N=95, 53.7% female, 4.2 ± 0.7 years). Participants wore ActiGraph GT3X+ accelerometers around the waist for seven ECEC days. A minimum of 250 minutes of wear time per day for a minimum of four days was required for inclusion in the analyses. Sedentary behaviour and total physical activity were identified using Pate cutpoints and independent samples t-tests were conducted to compare pre-COVID and COVID cohorts.

Results: Children in a child care setting spent significantly more time in sedentary behaviour pre-COVID (322.1 ± 47.2 min per day) than during COVID (290.7 ± 59.2 min per day; $p < .001$). Step count was also greater during COVID (5506.8 ± 1747.6 steps per day) compared to preschoolers step count pre-COVID (4847.6 ± 1771.8 steps per day; $p = .005$). Time spent in physical activity pre-COVID (119.3 ± 45.9 min per day) was not statistically different from preschoolers during COVID (120.2 ± 34.4 min per day; $p = .868$).

Conclusions: During the implementation of COVID guidelines, preschoolers engage in less sedentary behaviour and take more steps compared to pre-COVID levels. These changes may be connected to outdoor activities implemented by ECEC programs in an effort to follow physical distancing recommendations.

Describing and exploring accelerometer use among toddlers.

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Special Interest Group: J. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

Purpose: Studying physical activity (PA) via accelerometers among toddlers is challenging due to non-compliance with wear time (WT) instructions and parental non-compliance with completing activity logs (ALs). Processing software categorizes low activity counts as “sedentary.” Parent-completed ALs can help correctly categorize low activity counts for sleep and non-WT. The aims of this study are to ascertain 1) patterns of accelerometer and log compliance among participants, 2) whether compliance varies by parent qualities, and 3) whether sedentary time differs by compliance.

Methods: Baseline accelerometer and demographic data from a pilot RCT of a community wellness program for parents with toddlers (12-35 months) was used for a secondary analysis. Parents were instructed to have toddlers wear an Actigraph wGT3x accelerometer (Pensacola, FL) on the hip for 8 consecutive days and to complete ALs. A valid day included >600 minutes WT. The ActiLife6 program parsed raw activity counts into daily activity levels per standard protocol (Butte et al., 2014). Log accuracy scores were based on congruence between ALs and accelerometer counts. Non-parametric analyses examined relationships between variables.

Results: The sample (n=50) comprised toddlers (Mage = 27 months, 58% male) and parents (Mage = 31.7 years, 84% female), who were racially/ethnically diverse. Valid accelerometer data accompanied by ALs was provided by 28 families, whereas 8 returned only valid accelerometer data, 4 returned only ALs, and 10 provided neither. The mean for valid days was 5.02 (SD=3.78). The mean log accuracy score was 2.11 (SD=1.68) out of 4 possible points. On the ALs, 31 parents reported bedtimes, 23 reported naps, and 30 explained other non-WT. Parents with a spouse/partner were more likely to complete ALs (p<.05). Toddler sedentary time did not differ between those with ALs (356 min., SD=60.2) and those without ALs (341 min., SD=89.7).

Conclusions: Toddler and parent compliance with WT instructions and AL completion varied. Returned AL quality was poor with many missing key information to correctly characterize low activity counts. Sedentary time did not differ between toddlers with or without ALs. Research is needed to identify strategies to improve compliance and data quality in studies of early childhood PA.

The impact of a new government childcare accreditation standard on children's in-care physical activity and sedentary time

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Special Interest Group: F. Early care and education (SIG)

Purpose: A new physical activity and sedentary behaviour accreditation standard for childcare settings was introduced by a provincial government in Canada. The primary objective of this study was to examine if changes for in-care physical activity and sedentary time (ST) differed between centres in and around Edmonton, Alberta implementing the new accreditation standard and non-accredited control centres in and around Ottawa, Ontario. Secondary objectives were to examine whether age group (toddler, preschooler) or the childcare environment moderated any group differences in change of the primary outcomes and if changes in children's body mass index (BMI) Z-scores or cognitive development differed between accreditation and control groups.

Methods: Participants were 252 toddlers (19–35 months) and preschoolers (36–60 months) in Alberta (n=11) and Ontario (n=8) childcare centres from the supporting Healthy physical AcTive Childcare setting (HATCH) study. In-care ST (≤ 25 counts/15-seconds), light-intensity physical activity (LPA; 26–419 counts/15-seconds), and moderate- to vigorous-intensity physical activity (MVPA; ≥ 420 counts/15-seconds) were accelerometer-derived before and 6 months after the implementation of the new standard. At both time points, cognitive development (working memory, expressive vocabulary), heights, and weights were measured, and BMI Z-scores were calculated. Additionally, the childcare environment was objectively assessed using the Environment and Policy Assessment and Observation (EPAO) and Movement Environment Rating Scale (MOVERS) tools. Demographic characteristics were measured with the HATCH parent questionnaire and weather variables were derived from Environment Canada data. Mixed models were conducted.

Results: In adjusted models (n=241), change in children's in-care ST (B=-0.07, 95%CI: -1.43,1.29), LPA (B=0.08, 95%CI: -0.89,1.05), and log-transformed MVPA (B=0.01, 95%CI: -0.09,0.11) were not significantly different between groups. Age group and the childcare environment were not moderators. Significant increases in BMI Z-score (B=0.19, 95%CI: 0.03,0.35) and high working memory (OR=3.24, 95%CI: 1.32,7.97) were only observed in the accreditation group and significant increases in expressive vocabulary (B=3.18, 95%CI: 0.05,6.30) were only observed in the control group.

Conclusions: This new accreditation standard did not significantly increase physical activity or decrease ST in childcare settings and therefore may not explain findings for BMI Z-scores and cognitive development. Additional training and resources may be needed.

Changes to the childcare nutrition policy environment after a capacity-building intervention targeting physical activity and healthy eating in British Columbia, Canada

Dr. Claire Tugault-Lafleur¹, Dr. Patti-Jean Naylor², Dr. Valerie Carson³, Dr. Erica Lau⁴, Dr. Luke Wolfenden⁵, Dr. Louise Masse^{4, 6}

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Special Interest Group: E. Implementation and scalability (SIG)

Purpose. In 2016-17, the provincial government of British Columbia (BC) scaled up a capacity building initiative for early years providers (Appetite to Play (ATP)). The goal of ATP was to enhance the capacity of early years providers to implement policies and practices that supported both physical activity and healthy eating (HE). The purpose of this study was to determine whether the childcare environment changed with regards to HE policies and practices.

Methods. Surveys were conducted prior to (2015-16) and following the delivery of ATP (2018-19). Participants included managers and staff of licensed childcare centers serving children 3–5 years of age across BC. Hierarchical mixed effects models were used to examine change over time in 11 HE policies and 1 HE practice. Models controlled for childcare size and area-level population size, education and income.

Findings. A total of 1,479 respondents from 829 centers were included. Compared to 2015-16, childcare centers in 2018-19 had higher odds of having a written HE policies related to: providing HE education (OR: 2.6, 95% CI: 1.7, 4.1), HE training for staff (OR: 1.9, 95% CI: 1.1, 3.1), encouraging children to try new foods (OR: 1.8, 95% CI: 1.2, 2.8), serving family-style meals (OR: 2.3, 95% CI: 1.3, 4.0), offering water or milk (OR: 2.2, 95% CI: 1.4, 3.5), types of milk served (OR: 2.0, 95% CI: 1.2, 3.5), amount of fruit juice offered (OR: 2.6, 95% CI: 1.6, 4.4), staff role modeling of HE (OR: 3.1, 95% CI: 1.7, 5.9), including fruit and/or vegetables during meals and snacks (OR: 2.6, 95% CI: 1.6, 4.4), types of foods at parties (OR: 2.0, 95% CI: 1.3, 3.0) and types of foods brought from home (OR: 4.5, 95% CI: 2.9, 5.9). There was no change in staff behaviours related to checking the healthiness of foods packed in lunch boxes.

Conclusions. Substantial changes were observed over a 2-year period across all HE policies during the period of implementation support with ATP. The extent to which implementation of the ATP intervention led to improvements in dietary practices needs further exploration.

S3.20 - Neighbourhood drivability: driver of neighbourhood health?, June 10, 2021

Chair: Jeroen Lakerveld, Principal Investigator, Amsterdam UMC

Discussant: Gillian Booth, Professor, University of Toronto

Purpose: To share and discuss recent findings on environmental characteristics related to car driving in the context of spatial epidemiology.

Rationale: Car driving is a form of passive transportation associated with higher physical inactivity and sedentary behaviour. The decision to drive a car is likely to be influenced by the 'drivability' of the neighbourhood, i.e., how conducive an environment is to drive. For instance, through the availability of free parking, urban sprawling, fewer walkable destinations, etc. Much is still unclear in this rather new concept in spatial epidemiology: How does drivability impact on lifestyle-related chronic disease? What are key drivability characteristics and how can they be modified? Or how can cars be reduced even though drivability remains high? Relevant questions to guide further progressions in this upcoming field. In this symposium we share pioneering work that start to address these questions, and put their findings into context.

Objectives:

1. To share the results of a comprehensive study linking neighborhood drivability with diabetes incidence in a large population-based sample
2. To reflect on car sharing as a means to reduce cars in the neighbourhoods, and provide a reflection of car owners and non-car owners on it, and present whether the introduction of a shared mobility hub in a neighbourhood contributes to changes in attitudes, intentions and transport behaviours
3. To reflect on parking price to reduce car driving

Summary: The concept of drivability will be introduced by the chair. Next, three presenters will zoom into its impact on health, a potential entry point to reduce car use and change car drivers' attitudes, and the role of paid parking as one of the key components of drivability. Prof. Booth will put the contributions into perspective and kicks off a wider discussion with the audience and presenters.

Format:

00-05min: Introduction by chair (J. Lakerveld, The Netherlands)

05-20 min: Neighborhood drivability and diabetes incidence in Toronto, Canada (N. den Braver, The Netherlands)

20-35 min: Views on car sharing and changes in attitudes and travel behaviours after the introduction of a shared mobility hub in a residential neighbourhood in Utrecht, the Netherlands: a mixed-methods study (Stephanie Geertman, The Netherlands)

35-50 min: Parking price and car use (J. v. Ommeren, The Netherlands)

50-60 min: Discussion (Discussant: Prof. G. Booth, Canada)

Interaction: If corona measures allow, the symposium will be 'hybrid'; with the chair and speakers presenting and streaming from a venue in the Netherlands.

Neighborhood drivability and diabetes incidence in Toronto, Canada

Dr. Nicole den Braver¹, Prof. Joline Beulens^{1, 2}, Dr. Jeroen Lakerveld^{1, 2}, Mr. Peter Gozdya^{3, 4}, Ms. Fangyun Wu⁴, Dr. John Moin³, Dr. Ghazal Fazli³, Dr. Femke Rutters¹, Prof. Johannes Brug^{5, 6}, Prof. Rahim Moineddin^{4, 7}, Prof. Gillian Booth^{3, 7}
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Special Interest Group: H. Policies and environments (SIG)

Purpose: Reliance on cars contributes to physical inactivity, and therefore may be a risk factor for type 2 diabetes. We investigated whether living in neighborhoods that are highly conducive to driving is associated with an increased incidence of diabetes.

Methods: Working age adults (20-64 yrs) who were living in Toronto, Canada on April 1st 2011, were followed over 6 yrs for incident diabetes using a validated algorithm based on hospital records and physicians' services claims. For neighborhood drivability, we used a novel index capturing three factors of the built environment: urban sprawl, pedestrian unfriendliness and parking options. Cox regression was used to examine the association between neighborhood drivability quintiles (Q) and diabetes incidence, adjusting for age, sex, income, ethnicity, immigration status and comorbidity, and censoring for death.

Results: Among 1,473,994 individuals in our sample (mean age 40.9±12.2, 48.5% male), 77,835 developed diabetes. Overall, there was a direct relationship between drivability and diabetes incidence, however the magnitude of this effect varied by age and income. Among young adults (20-34 yrs), those living in the most drivable neighborhoods (Q5) had a 58% higher incidence of diabetes (adjusted HR: 1.58 (95%CI: 1.47-1.69)) relative to those in the least drivable neighborhoods (Q1), whereas the same comparison in older adults (55-64 yrs) yielded smaller differences (HR: 1.31 (95%CI: 1.26-1.36)). High drivability was most strongly associated with diabetes risk in the middle income neighborhoods with 96% increased risk for young residents (HR:1.96 (95%CI: 1.64-2.33)) and a 46% increased risk for older residents (HR: 1.46 (95%CI:1.32-1.62)). Associations between drivability and diabetes incidence were significant but of a lesser magnitude in low- and high-income neighborhoods.

Conclusions: In our setting, neighborhood drivability is a risk factor for the diabetes incidence among working age adults, especially younger, middle-income populations.

Views on car sharing and changes in attitudes and travel behaviours after the introduction of a shared mobility hub in a residential neighbourhood in Utrecht, the Netherlands: a mixed-methods study

Dr. Stephanie Geertman¹, Dr. Carlijn Kamphuis¹

¹Department of Interdisciplinary Social Science, Faculty of Social and Behavioural Sciences, Utrecht University, Utrecht, Netherlands

Special Interest Group: H. Policies and environments (SIG)

Purpose: Replacement of car ownership by car sharing can have multiple positive effects, including increased use of active modii (walking, cycling), reduced vehicle miles travelled, and increased liveability of cities. Less is known on how car sharing can be encouraged. The aims of this study are: 1) to explore views on car sharing among car owners and non-car owners, and 2) to investigate whether the introduction of a shared mobility hub in a neighbourhood contributes to changes in attitudes, intentions and transport behaviours.

Methods: A mixed methods design was employed. Participants were adults residing within 1km from a 'shared mobility hub' (i.e. a hub with different types of cars available for sharing, located in a central parking space), which opened on January 31st 2020 in a residential neighbourhood in Utrecht, the Netherlands. We conducted a baseline survey in January 2020 (n=227), semi-structured qualitative interviews in April-June 2020 (n=24), and a follow-up survey in September 2020 (n=84). Qualitative interviews were recorded, transcribed verbatim and analysed following a grounded theory approach using NVivo software. Survey data were analysed in SPSS.

Results: Important themes during the interviews were: irrational and emotional arguments for car ownership and car sharing; the need for a wide range of cars (brands, sizes) to choose from; shared cars as replacement for travelling by bike or public transport; contribution of the shared mobility hub to community connectiveness. Views differed largely between car owners and non-car owners, which was also confirmed by the survey data. Intention to use the shared mobility hub at baseline was much higher among non-car owners (71%) than car owners (38%). Observed changes in attitudes, intentions and behaviours between baseline and follow-up were likely influenced by the Covid-19 pandemic and lockdown.

Conclusions: In a compact Dutch city with good public transport and high cycling levels, the introduction of a shared mobility hub can have positive effects (e.g. more positive attitudes towards car sharing, increased community connectedness), but also unwanted effects (e.g. biking and public transport trips being replaced by car sharing). It is therefore important to evaluate policies to encourage car sharing from a systems perspective.

Citywide parking policy and congestion: Evidence from Amsterdam

Mr. Francis Ostermeijer^{1,2}, Prof. Hans Koster^{1,2}, Mr. Leonardo Nunes^{1,2}, **Prof. Jos van Ommeren^{1,2}**

¹Vrije Universiteit Amsterdam, Amsterdam, Netherlands, ²Tinbergen Institute Amsterdam, Amsterdam, Netherlands

Special Interest Group: H. Policies and environments (SIG)

We examine the effect of paid parking policy on parking demand and traffic flow in the city of Amsterdam. We observe all 50 million parking observations for the years 2018 and 2019. Furthermore, we observe traffic flow from induction loops also provided by the municipality of Amsterdam. In addition we receive information about the parking occupancy of offstreet parking by a substantial number of parking providers.

Using variation from a sudden citywide increase in average hourly on-street parking prices from about 30 to about 4.5 year on average, hence by over 50%, while using a difference in difference methodology, we show that the number of hours parked decreases by 18% whereas the number of parking arrivals declines by 10%. It appears that commercial parking providers also strongly increased prices after the increase in on street parking prices, so the net effect of the change in parking policy on demand for commercial parking is quite small.

We also show that the policy induced a decrease in overall traffic flow of around 2%. We also find larger effects during the afternoon peak, which indicates that parking prices are an effective tool to reduce citywide traffic demand and congestion. We conclude that using parking prices is an effective way of reducing car use and related external effects such as pollution in cities. Because only one quarter of all traffic movements is related to parking, other policies are also important.

S3.21 - Building healthier communities through young eyes and voices: Experiences from Africa and the Americas, June 10, 2021

Chair: Nicolás Aguilar-Farias, Assistant Professor, Universidad de La Frontera
Discussant: Mark Fenton, Adjunct Associate Professor, Tufts University

Purpose: the symposium will share participatory action research experiences focused on understanding and improving environments to provide healthier opportunities involving children, adolescents and young adults from Colombia, South Africa, and the United States. We will present key findings from the Our Voice citizen science research model and challenges for future community-engaged research and actions in different settings.

Rationale: Improving opportunities to provide better social and physical development in the population is a major challenge for all regions in the world, particularly when facing inequities and limited resources. Young people's voices are usually excluded in the design of policies and strategies, even when these may benefit them directly. Community-engaged participatory action research may present an opportunity to complement top-down approaches in decision-making processes.

Objectives: To share findings from community participatory research conducted by children, adolescents and young adults from diverse settings in Colombia, South Africa and the United States. To discuss potential challenges when implementing community-engaged participatory action research for improving opportunities for better health. To reflect on the current and future implications of involving young people in the design of strategies at the local and global level.

Summary: The presentations will include findings from community-driven research that included children, adolescents and young adults who used the Our Voice citizen science research model in diverse settings in Colombia, South Africa and the United States. The discussant will summarise and put into perspective learning experiences and challenges to move research into practice.

Format: 4+1 min. Introduction. Chair: Nicolas Aguilar-Farias 10+1 min. Engaging U.S. Youth in Community-based Citizen Science to Reduce Health Inequities. Presenter: Prof Abby King 10+1 min. Lessons learned from Our Voice in Bogotá: involving youth in citizen science to evaluate and drive change for healthy living in urban settings in Bogotá, Colombia. Presenter: María Alejandra Rubio 10+1 min. Citizen science to better understand barriers to and facilitators of physical activity and healthy eating in South African adolescents from low and middle-high income communities before and during the COVID-19 pandemic. Presenter: Feyisayo Odunitan-Wayas 15+5 min Discussion lead by Mark Fenton

Interaction: The discussant will facilitate the discussion among presenters and the audience. Polls and word clouds will be used to summarize thoughts and ideas from the audience. The chair will collect questions from the audience to be addressed at the end of the session.

Engaging U.S. Youth in Community-based Citizen Science to Reduce Health Inequities

Prof. Abby King^{1,2}, Ms. Ann Banchoff², Miss Caroline Zha², Miss Isela Blanco-Velasquez²

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Special Interest Group: G. Children and families (SIG)

Expanding health disparities in a growing number of countries worldwide coupled with their accumulating negative health effects across the life course underscore the importance of addressing the social and environmental factors underlying these effects from an early age. Improving health, educational, social, and environmental opportunities for young people across the socioeconomic continuum can arguably be accelerated through “bottom-up” community-driven approaches that can complement and extend more traditional “top-down” policy approaches to change. Involving youth directly in participatory action research that builds their skills and agency in achieving relevant changes to their local environments can have additional benefits related to increasing their feelings of engagement, belongingness, and empowerment. Results from a set of U.S. youth studies employing a particular community-engaged citizen science research method called Our Voice will be presented. These studies have targeted a range of educational venues (elementary school through college) as well as other community settings; diverse youth populations across the socioeconomic spectrum (low-income through affluent); and a range of community health issues (i.e., safe routes to school, neighborhood safety, local park access and use, gender-based violence and gender equity, mental health, clinic-community partnerships in promoting safe environments during the COVID-19 pandemic). Among the types of community changes to which youth citizen scientists have been able to effectively contribute have been enhancements in a safe routes to school program resulting in double the number of school-based safe routes programming events as well as double the number of elementary school children walking/biking to school compared to a control school; reporting of unsafe sidewalks and illegal neighborhood dumping of trash from surrounding affluent neighborhoods; initiation of recreational activities at a local park that were youth-developed and contributions to programming for teens at a downtown temporary pop-up park; identification of strategies to reduce the probability of gender-based violence among undergraduates and enhance graduate student mental health in a university setting; and citizen science activities capturing COVID19-related community safety issues experienced by families from disadvantaged neighborhoods in partnership with their local health care providers. Challenges and future directions for this type of promising participatory research method will be discussed.

Lessons learned from Our Voice in Bogotá: Involving youth in citizen science to evaluate and drive change for healthy living in urban settings in Bogotá, Colombia

Miss Maria Alejandra Rubio¹, Mr. Tomas Guevara¹, Dr. Olga Lucia Sarmiento¹, Miss Silvia A. Gonzalez^{1, 2}, Miss Diana Higuera¹, Dr. Adriano Akira Hino³, Dr. Nicolas Aguilar-Farias⁴, Ms. Ann Banchoff⁵, Dr. Lisa G. Rosas⁵, Dr. Benjamin W. Chrisinger⁶, Dr. Abby C. King⁵

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Special Interest Group: G. Children and families (SIG)

Purpose: The supportive role of the built environment for human health has become a focus of interdisciplinary research, policy development, and intervention. Within the multisectoral efforts to build healthy cities, participatory approaches represent a potential course for better targeting context-specific factors that can hinder or facilitate healthy living. The overall purpose of the Our Voice in Bogotá study was to apply the Our Voice citizen science research model to engage residents through the lifespan, including youth and adults, to assess facilitators and barriers to healthy living in five urban settings including schools, public transportation, markets, the Ciclovía open streets program, and public parks.

Methods: We conducted thematic analysis to 1) critically review the findings to comparatively build transversal categories based on similar themes across the five evaluated settings, 2) recode the setting-specific data using the transversal categories and 3) assess lessons learned by using a life course approach to identify youth-specific relevant findings (focus on data collected by citizen scientists between 9 to 18 years old).

Results: We identified nine transversal categories relevant to almost all the evaluated settings: infrastructure, maintenance, human talent, green spaces, availability and access to sport facilities, food availability, citizen culture, accessibility and transportation, and complimentary services. All of which underline the community level of action, indicating that citizen scientists found the facilitators and hinderers of healthy living at this level the most important. Regarding the youth-specific findings, the most reported barriers across the urban settings assessed by youth citizen scientists (schools, markets and the Ciclovía) were the bad maintenance of facilities, poor waste management and limited healthy food availability. In terms of facilitators, youth citizen scientists underscored the green spaces, availability of sports facilities, and citizen culture.

Conclusions: The transversal categories comprise citizen scientists and stakeholders' discussions and can impact different settings by acknowledging life course appropriateness. Beyond the location-specific nature of the findings from each evaluated setting, Our Voice in Bogotá also brings relevant findings to advance health-promoting initiatives in

urban settings across ages. Additionally, Our Voice in Bogotá facilitated youth advocacy for improvements within the evaluated settings.

Citizen science to better understand barriers to and facilitators of physical activity and healthy eating in South African adolescents from low and middle-high income communities before and during the COVID-19 pandemic

Dr. Feyisayo Odunitan-Wayas¹, Prof. Tolu Oni^{2,3}, Dr. Sacha West⁴, Prof. Abby King^{5,6}, Prof. Estelle Lambert¹

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Special Interest Group: G. Children and families (SIG)

Purpose: Adolescents face various socioecological and environmental factors that influence their opportunities for physical activity (PA) and choices for healthy eating, further compounded by the COVID-19 pandemic. This study aimed to identify these factors and adolescents' perceptions concerning PA opportunities and food choice decisions.

Methods: Adolescents (N=143) were recruited from 3 high schools in Cape Town, residing in low or middle-high income communities. Anthropometry, self-reported PA, dietary habits and knowledge and neighbourhoods walkability data were collected, as part of a larger, multi-country study. Of these, 33 participants of both genders between the ages of 13-18 years were purposively selected as citizen scientists' In-depth telephonic interviews were audio-recorded, transcribed and thematically analysed. They used a mobile application to take photos and provide audio narratives of factors in their immediate environments that were barriers to or facilitated PA and healthy eating, before and during the COVID-19 pandemic. Emergent themes were classified into different levels of the socio-ecological model: intrapersonal, interpersonal, environmental and policy.

Results: Preliminary analyses indicate that before the COVID-19 pandemic, unhealthy eating and physical inactivity were influenced by household foodways and attitudes toward physical activity (interpersonal), preferences, screen time and "laziness" (intrapersonal), and easy access to unhealthy food (environmental). Peer pressure, unsafe environments, time constraints and unaffordability of healthy food were unique to adolescents from low-income communities. Organised sports in school and outside of school were more common for adolescents from middle-high communities, while chores and active transport dominated the PA activities for those from low-income areas. The COVID-19 pandemic lockdown in South Africa impacted negatively on the PA levels because of reduced mobility. Healthy food choice decisions were adversely affected by food insecurity in some households, particularly as some learners relied on school feeding programs, but positively impacted because of limited access to fast food outlets and convenience stores.

Conclusions: These findings will form the basis of interactive advocacy workshops with the citizen scientists, for their input and proffered solutions to the barriers and to empower them to advocate for changes in their immediate environments for healthy and active living

S3.22 - Sedentary behaviour prevalence, contexts and implications for future behaviour change programmes, June 10, 2021

Chair: Jan-Philipp Lange, PhD student, University of Konstanz

Discussant: Martina Kanning, Chair of Social and Health Sciences, Sportscience University of Konstanz

Purpose: To discuss different aspects of objectively monitored sedentary behaviour (SB), SB contexts and the feasibility of multi-method interventions. This session will help to further understand SB and inform future behaviour change programmes.

Rationale: SB has been defined as any waking behaviour characterised by an energy expenditure of 1.5 METs or lower while sitting, reclining or lying. High levels of SB are associated with detrimental effects on health outcomes including all-cause mortality, incidence of cardiovascular disease and type 2 diabetes. WHO guidelines on physical activity and SB include to limit time spent being sedentary by replacing SB with physical activity. However, it remains unclear how this change of behaviour can be introduced to individuals' everyday lives. To date, little research is available on the readiness for behaviour change during time spent sedentary in different contexts.

Objectives:

To examine SB in different contexts and appraise their importance for sedentary prevention.

To present the amount spent in SB in active office workers motivated to reduce their SB and implications for behaviour change programmes.

To determine the feasibility of interrupting prolonged sedentary bouts by leveraging multiple measures to assess behaviour, glucose homeostasis, and behavioural contexts in healthy youth.

Summary:

Presentation 1 will present data from an event-triggered EMA study to assess the context and psychosocial constructs of prolonged sitting.

Presentation 2 will present data from a cross-sectional study using thigh-worn accelerometers in active office workers. Findings will be discussed in the context of sedentary prevention.

Presentation 3 will present data from a pilot feasibility study using accelerometers, continuous glucose monitors, and EMA surveys aimed at interrupting prolonged SB in healthy youth.

Format

(60'): Introduction (5'): Jan-Philipp Lange (University of Konstanz, Germany) 1st presentation (15'): Marco Giurciu (Karlsruhe Institute of Technology, Germany): Does the social and environmental context moderate the association between sitting bouts and affective states? 2nd presentation (10'): Jan-Philipp Lange (University of Konstanz, Germany): Active, motivated but sedentary: Can accelerometer data from office workers help us to reduce sedentary behaviour? 3rd presentation (15'): Britni Belcher (University of Southern California, United States): Feasibility of interrupting sedentary behaviours and combining accelerometers, continuous glucose monitors, and ecological momentary assessment in the free-living environment in healthy youth Discussion (15'): Martina Kanning (University of Konstanz, Germany)

Interaction: the discussant will pre-select questions asked in the chat and include them in the discussion. If desired, members of the audience can repeat their contribution in person.

Does the social and environmental context moderate the association between sitting bouts and affective states?

Dr. Marco Giurgiu^{1,2}, Prof. Martina Kanning³

¹Karlsruhe Institute of Technology (KIT), Department of Sports and Sports Science, mental mHealth lab, Karlsruhe, Germany, ²Central Institute of Mental Health, Department of Psychiatry and Psychotherapy, Medical Faculty Mannheim, Heidelberg University, Mannheim, Germany, ³University of Konstanz, Department of Sports Science, Social and Health Sciences, Konstanz, Germany

Special Interest Group: D. e- & mHealth (SIG)

Purpose: Previous studies revealed first evidence of a negative association between time spent sitting and affective states. In particular, prolonged sitting time is a potential risk factor for decreasing momentary affective states. However, whether the social and environmental context might moderate these effects is mainly unknown.

Methods: In four independent studies, we collected data from 308 participants (50.3% female, age: 27.4 yrs., range: 17-66) by using the ecological momentary assessment approach (EMA). Sitting time was continuously assessed via a thigh-worn accelerometer, and affective states were captured multiple times per day via electronic diaries on study smartphones. Moreover, we used a cutting-edge algorithm to assess social and environmental context information “just in time”. That means the accelerometer transferred data to the smartphone and whenever a participant remained in an uninterrupted sitting bout of $\geq 20/30$ minutes, the smartphone triggered contextual questions (i.e., alone vs. not-alone; and work vs. home) to the participants.

Results: Social and environmental context significantly (P values < 0.001) moderated the effects of sitting bouts on affective states. In practice, sitting bouts in company with others were associated with higher valence levels and energetic arousal. Furthermore, sitting bouts during leisure time were associated with higher levels of valence and calmness and lower levels of energetic arousal. Significant interaction analyses revealed that participants felt best while sitting during leisure episodes together with others.

Discussion: The study showed that the social and environmental context moderated the association between sitting bouts and momentary affective states. Sitting with others, sitting during leisure time, and especially sitting during leisure time and with others, was associated with better feelings. The results indicate that not all sitting bouts are equally bad for well-being. Moreover, our valid ecological findings may inform future intervention studies, which target to increase well-being to focus mainly on sitting bouts during work conditions and while being alone.

Active, motivated but sedentary: Can accelerometer data from office workers help us to reduce sedentary behaviour?

Mr. Jan-Philipp Lange¹, Prof. Dr. Martina Kanning¹

¹University of Konstanz, Konstanz, Germany

Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: Sedentary behaviour (SB) especially sitting for large proportions of the day has become a public health concern. Due to the nature of their occupation, office workers are exposed to a high risk of engaging in SB and prolonged sitting during their everyday lives. The aim of this ecological momentary assessment (EMA) study was to describe the physical activity (PA) and SB patterns of office workers, identify potential health risks, and to inform the development of future interventions to reduce sitting and promote PA.

Methods: Seventy-seven office workers participated in a seven-day EMA-study. Time spent in PA and SB was assessed via thigh-worn accelerometers worn during waking hours. Participants' habit to perform tasks while standing (5-point likert scale) and stages of change (SOC) for SB reduction were assessed using self-reports before starting the EMA period. Descriptive analyses were conducted for self-report and accelerometer data.

Results: Data of 69 participants (age = 46.2 ± 10.6; 86% female) were included in the analyses. 93% reported that they were in a preparation or action/maintenance SOC for SB reduction. Self-reported habit to perform tasks while standing was $m = 2.9 (\pm 0.95)$. Participants provided valid activity monitor data for 287 work days in total. On average, accelerometers were worn on 15.7 h/day. Office workers spent 10.6 h/day in SB, 3.3 h/day standing and 1.8 h/day in PA while taking 8934 steps/day. Sedentary bouts < 5 min were the most frequent (22.24/day) while bouts > 30 min occurred less often (6.26/day), but accounted for 5.8h/day (55%).

Conclusions: Office workers spent two thirds of their work days in SB. Regardless of their high motivation to spend less time sedentary and their above average PA, office workers spent more time in SB than the population average and accumulated more than half of the total time in prolonged bouts of > 30 min. These findings indicate an intention behaviour gap for time spent in SB. Interventions aiming to reduce time spent in SB should focus on volitional strategies such as behaviour change techniques like action planning, which facilitate overcoming this gap.

Feasibility of interrupting sedentary behaviours and combining accelerometers, continuous glucose monitors, and ecological momentary assessment in the free-living environment in healthy youth

Dr. Britni Belcher¹

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Special Interest Group: G. Children and families (SIG)

Purpose: Sedentary behaviours (SB) are risk factors for poor cardiometabolic health in youth, and novel intervention strategies are needed. The purpose of this pilot study was to determine the feasibility of: 1) interrupting prolonged SB in a free-living setting; and 2) leveraging multiple measures to assess relationships between objectively measured SB, glucose homeostasis, and behavioural contexts in a free-living setting in adolescents.

Methods: Healthy youth (N=15; mean(SD) age=13.1(1.0) years, 66.7% female, 66.7% healthy weight) completed two 1-week conditions in random order: 1) habitual activity; or 2) wrist-worn device-prompted interruptions of prolonged (30+ minutes) SB. Participants simultaneously wore an ActivPAL accelerometer on the right thigh, a Freestyle Libre continuous glucose monitor (CGM) on the back of the upper arm, and completed ecological momentary assessment (EMA) surveys up to 7 times/day on self-reported behaviours and contexts.

Results: 93% of participants completed both assessments. There were no significant differences in accelerometer-measured SB characteristics between the conditions. Across the two assessment weeks, participants recorded an average of 7.6 (1.3) sitting bouts lasting longer than 30 min/day, and 3.2 (0.9) sitting bouts lasting longer than 60 min/day for an average of 839.4 (106.0) and 658.1 (108.0) min/day, respectively, spent in sedentary bouts lasting longer than 30 or 60 minutes at a time. They averaged 70 sit-to-stand transitions per day. There were no significant differences between the conditions on compliance with the multiple measures. Participants provided an average of 6.4 (1.7) valid days (10+hrs/day) per week of accelerometer data. Participants had 85% compliance with 24-hour CGM wear and contributed an average of 6.7 (1.9) days/week. There was a 65.0% compliance rate with the EMA surveys. Participants who were 12+ years old, male, had mothers with less than a college education, or who had overweight/obesity had higher EMA survey response rates.

Conclusions: Employing multiple modalities to assess SB, glucose homeostasis, and EMA-measured SB behaviours and contexts is feasible in a free-living setting in youth. However, more work is needed to better understand how to effectively prompt interruptions in prolonged sedentary time using multiple modalities in free-living settings with adolescents.

**O3.31 - Addressing physical activity in children,
June 10, 2021**

Associations of Twenty-Four-Hour Movement Behaviors and Temperament and Vocabulary Knowledge in Early Childhood with Compositional Isotemporal Substitution

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Special Interest Group: G. Children and families (SIG)

Temperament and vocabulary knowledge are indicators of behavioral and cognitive development in early childhood and have independently been linked to 24-hour movement behaviors (sedentary time [SED], light physical activity [LPA], moderate-to-vigorous physical activity [MVPA], and sleep). Movement behaviors may have interactive effects on these developmental markers.

Purpose: To examine predicted changes in preschool-aged children's temperament and vocabulary knowledge when reallocating time between movement behaviors using compositional isotemporal substitution.

Methods: This cross-sectional analysis was conducted in data from 206 children (50.9±9.5 months; 46.1% female). Movement behaviors were assessed with wrist-worn accelerometers for up to 15 days (9.7±3.3 days; 9.8±3.3. nights). Indicators of child temperament (surgency extroversion, negative affectivity, and effortful control) were derived from the Child Behavior Questionnaire Very Short form completed by caregivers. The Peabody Picture Vocabulary Test (PPVT) was used to assess vocabulary knowledge. First, baseline linear regression models predicted estimates of temperament and vocabulary outcomes with 24-hour movement behaviors as isometric-log ratio coordinates using age and sex as covariates. Next, models with new compositions that included one-to-one time reallocations predicted new outcome estimates, which were then compared to baseline predictions.

Results/Findings: When theoretical time reallocations up to 60 minutes (in 10-minute increments) were examined, there were no significant differences in estimates of temperament. However, adding time to sleep at the expense of SED or MVPA and adding time to LPA at the expense of SED or MVPA was associated with increased estimates of PPVT score. For example, reallocating 20 minutes of SED to sleep, MVPA to sleep, SED to LPA, and MVPA to LPA were associated with increased PPVT scores of 1.7 (95% CI = 0.4 to 3.1), 3.0 (95% CI = 0.5 to 5.5), 2.4 (95% CI = 0.6 to 4.2), and 3.7 (95% CI = 0.6 to 6.9), respectively. Estimates of change in PPVT scores for these behaviors increased with greater time reallocations.

Conclusions: Interaction of sleep and wake behaviors had no effect on temperament but did contribute to vocabulary knowledge. As such, interventions aiming to improve vocabulary knowledge in preschoolers may consider approaches to increase sleep and LPA.

Physical activity and depression in mothers of a child with a special health care need: informing future interventions

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Special Interest Group: G. Children and families (SIG)

Mothers of a child with a special health care need have worse mental and physical health compared to other mothers. Physical activity (PA) may improve depressive symptoms (DS) and overall health; however, little is known about PA in mothers who have a child with a special health care need. **Purpose:** The aim of this study was to examine acceptable types of PA in mothers who have a child with a special health care need to improve DS and inform future interventions. **Methods:** Mothers completed a survey (n=348; age=39.3±7.3 yrs; white=92%; Midwest=80.1%; employed=59.2%; prenatal/at birth diagnosis=51.7%) that assessed demographics, general child information, PA and PA preference, depression, and emotional health. Descriptive statistics were calculated for quantitative questions. Qualitative responses were gathered and categorized to understand interest and type of PA participation. **Results:** Mothers reported meeting PA guidelines before pregnancy (50.9%), during pregnancy (30.7%), postpartum (30.2%), and currently (39.1%). A majority (59.8%) of mothers reported DS. Over 77% (n=268) of mothers participated in some type of PA, and did so to help with DS (37%), better overall health (76%), better quality of life (77%), and weight loss (57%). Mothers who engaged in PA (37%) primarily used walking (65.6%), house cleaning (56%), yoga (40%), strength training (38%), jogging (33%), and other (23%) to cope with depression. However, 85% of all participating mothers were interested in using PA (85%) and yoga (71%), as a means to cope with DS. Qualitative responses for why mothers participate in PA included: cannot die due to my son's needs, have to remain fit/strong to physically care for my child, to be strong enough to care for my daughter, self-love, and for personal time away. **Conclusions:** The quantitative and qualitative data suggest the majority of mothers' view PA as a means to increase health and fitness to meet the needs of their children with a special health care need, though fail to meet the levels of PA associated with DS reduction. Future interventions and public health initiatives should consider population-specific PA norms, PA interests and PA rationale to increase the salience of meeting PA recommendations in this vulnerable population.

Active transportation to school among Colombian children and adolescents: national prevalence and correlates

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Special Interest Group: G. Children and families (SIG)

Purpose: Active transportation has multiple health, environmental and economic benefits. Considering its wide benefits, it is relevant to determine the national situation of this behavior to guide the design of initiatives that support walking and cycling promotion. In Colombia, active transportation has been assessed in multiple local and regional studies, with widely differing findings, but national data on active transportation are scarce. The 2015 National Survey of Nutrition assessed the engagement in active transportation to/from school in a nationally representative sample for the first time in the country. This paper aims to describe the prevalence and factors associated with active transportation to/from school among Colombian children and adolescents.

Methods: We analyzed nationally representative data from the National Survey of Nutrition 2015, a cross-sectional survey with a stratified, multistage probability cluster sampling design. The sample for this analysis included 2,867 preschoolers (3-5 years), 4,005 school-aged children (6-12 years), and 4,594 adolescents (13-17 years). Active transportation to/from school was reported by parents for pre-schoolers and school-aged children and self-reported by adolescents. Descriptive statistics were calculated, and prevalence ratios were estimated using Poisson regression multivariable models with robust variance. All the analyses were conducted using STATA 14.0 with the SVY module for complex samples to take into account the characteristics of the study design.

Results: Approximately 70% of Colombian children and adolescents reported engaging in active transportation to/from school over the last week. There were no differences by sex among pre-schoolers nor school-aged children. Fewer adolescent females than males used active transportation. Children and adolescents with car availability at the household were less likely to walk or cycle to/from school. Pre-schoolers and school-age children living in Bogota were more likely to report active transport than children from other regions and school-age children and adolescents with a lower wealth index were more likely to use active transportation than their counterparts.

Conclusions: The wealthiest children and adolescents, adolescents from rural areas, and female adolescents should be a focus for future interventions. Actions need to be implemented to maintain the high involvement in active transportation to/from school in Colombia.

Meeting physical activity guidelines: associations with gut microbiome in pre-adolescent children

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Special Interest Group: G. Children and families (SIG)

Purpose: To determine if there is an association between physical activity (PA) and gut bacterial microbiota in a cohort of 10-year-old children from the racially and socioeconomically diverse Wayne County Health Environment Asthma and Allergy Longitudinal Study (WHEALS) birth cohort.

Methods: At 10 years of age, WHEALS children were invited to complete a research clinic visit that included anthropometric assessment (height, weight) and to complete a questionnaire. PA was assessed using the Block Physical Activity Screener (BKPAS), which provides minutes/day PA variables that were used to determine whether the child was meeting PA recommendations (i.e., 60 minutes of moderate-to-vigorous PA). Children also provided a stool sample; 16S rRNA sequencing was used to profile the bacterial gut microbiota present. Differences in alpha diversity metrics (richness, Pielou's evenness, and Faith's phylogenetic diversity) by PA were tested using linear regression, while beta diversity (unweighted and weighted UniFrac) was tested using PERMANOVA ($p < 0.05$ considered significant). Taxonomic testing was performed using DESeq2, with False Discovery Rate adjusted $p < 0.05$ considered significant.

Results/findings: The analytic sample included 321 children with both PA and 16S sequencing data (mean age (SD) = 10.2(0.8) years; 54.2% male; 62.9% African American). After adjusting for covariates (maternal education, household income, location of residence, sex, child race, breastfeeding status at 1-month, BMI category at age 10, and diet), PA was not significantly associated with stool richness, evenness, or diversity at age 10 (all $p \geq 0.28$). However, estimated daily moderate PA minutes (Weighted UniFrac $R^2 = 0.007$, $p = 0.045$) as well as meeting recommendations of PA (Weighted UniFrac $R^2 = 0.014$, $p = 0.001$) were significantly associated with distinct gut bacterial composition. These compositional differences were partly characterized by an increased abundance of *Prevotella_2* as well as specific Christensenellaceae_R-7_group OTUs in children with greater PA.

Conclusions: Although PA has recently been established as a probable modulator of the gut microbiome, alterations in the abundance of specific taxa at different life stages remains unclear. The results of this study suggest that children who meet recommendations of PA have alterations in their gut microbiome. Whether this translates to reduced risk of obesity or associated metabolic diseases requires additional study.

Is weight status an important predictor of children's' fitness? A 10-year study on NYC public school youth

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Special Interest Group: G. Children and families (SIG)

Purpose: Low levels of physical activity in children correspond to low physical fitness. Children with obesity have lower fitness; however little is known about the obesity-fitness relationship as the severity of obesity increases. To address this gap, we examined the longitudinal association between weight status and fitness in a large, diverse sample of New York City school children.

Methods: A prospective cohort analysis was conducted with New York City public school children in grades 4-12 from the NYC Fitnessgram dataset (11 cohorts; 2006-2017). The NYC Fitnessgram includes annual assessments of weight and fitness collected during physical education classes. Weight status was assessed using the Centers for Disease Control growth charts and classes of obesity were defined using body mass index relative to the 95th percentile. Fitness was measured as a composite fitness z-score to account for expected improvements with increasing age and sex. The composite score was based on measures of aerobic capacity assessed with the Progressive Aerobic Cardiovascular Endurance Run, and muscular strength and endurance assessed with the push-up and curl-ups tests. Demographic factors including child sex, grade, race/ethnicity, poverty, and country of birth were extracted from enrollment records. Longitudinal mixed models with random-intercepts were developed to test the weight class-fitness association. Secondary models tested for interaction effects of demographic factors on the weight class-fitness association.

Results/findings: The sample included 1,114,333 children (50% male, 37.5% Hispanic, 26.5% non-Hispanic Black, 10.9%, 3.6%, and 1.3% class I, II and III obesity, respectively). Compared to children with healthy weight, increasing level of obesity was associated with decreased fitness: overweight ($\beta = -0.71$, 95% CI: -0.71, -0.70), class 1 obesity ($\beta = -1.41$, 95% CI: -1.41, -1.40), class 2 obesity ($\beta = -2.12$, 95% CI: -2.13, -2.11), and class 3 obesity ($\beta = -2.82$; 95% CI: -2.84, -2.80). Interaction models showed the magnitude of the inverse dose response pattern of association between weight status and fitness increased in magnitude for male, high school, Hispanic, lower income and US-born children.

Conclusions: Given independent effects of fitness on health outcomes, targeted clinical and public health interventions are needed to improve the fitness of children with obesity.

Acceptability and preliminary efficacy of a summer pilot intervention to improve physical activity in high-risk middle school youth

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Special Interest Group: G. Children and families (SIG)

Purpose: Summer is a critical time to keep youth engaged in physical activity (PA). This study presents the feasibility and preliminary efficacy of a 6-week home-based pilot physical activity intervention, Camp from Home, designed as a summer extension of a school-based afterschool PA program.

Methods: This multi-component home-based PA intervention enrolled youth from five high-risk middle schools in Philadelphia in the summer of 2020. The intervention included 1) three bi-weekly home deliveries of program materials, 2) access to a private YouTube channel with sport and exercise videos, and 3) daily text-messages from a health coach. Home deliveries included sports equipment (e.g., basketball, yoga mat), fresh produce, recipes, and handouts to guide goal-setting and self-monitoring. Parents and youth completed baseline and follow-up surveys to assess program satisfaction, YouTube analytics examined online engagement, and youth self-reported outcomes using validated measures.

Results/findings: A total of 67 youth were enrolled in the program (12.3 (1.2) years, 91.0% Black/African American, 38.8% female). Fifty parents (74.6%) and 34 children (47.8%) completed surveys at the end of the program. A majority of parents (86.0%) reported the overall program as “helpful” or “very helpful” for their child’s health over the summer. Parents also rated the following as “helpful” or “very helpful” in response to the program components: the delivery of sports equipment (98.0%), the delivery of fresh produce and recipes (98.0%), and text-messages from health coaches (86.0%). Most parents (96.0%) and youth (83.8%) expressed interest in participating in the program again. YouTube videos were viewed 1,513 times, but students only watched 16.8% of each video for an average time of 4.3 minutes. Though response rate was low, youth reported a significant improvement in PA ($M(sd)=4.2(7.9)$, $p<0.004$) and PA self-efficacy ($M(sd)=0.4(1.0)$, $p<0.03$).

Conclusions: Provision of program materials (e.g., sports equipment) were reported by parents to be particularly helpful components of the Camp from Home program. Youth engagement with digital components was low, but overall program acceptance was high. Youth reported increases in PA and PA self-efficacy, but future studies are needed to examine the most effective intervention components and mechanisms of behavior change for this high-risk group.

**O3.32 - mHealth intervention development and evaluation among
different populations,
June 10, 2021**

Objectively measured physical activity among college students during COVID-19 pandemic

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Special Interest Group: D. e- & mHealth (SIG)

Purpose: In 2020, the coronavirus pandemic (COVID-19) caused many university campus lockdowns in which students were required to leave campus and continue their academic work as usual, remotely. The University of Vermont Wellness Environment (WE) program is a wellness behavioral change promotion program. Students who enrolled in the WE program were given an Apple Watch to track their daily physical activity (PA). The purpose of the study is to evaluate the change of PA levels in a large cohort of U.S. college students before and after the COVID-19 pandemic.

Method: Objectively measured daily step data by Apple Watch were downloaded through healthkit. A total of 250 WE and 124 non-WE participants (291 female and 83 male) who were college freshman were included in this study. The average number of valid wear days per participant was 31 out of a possible 119 days in Spring semester 2020. The self-perceived COVID-19 disruption and COVID-19 related questions were assessed in the end of year questionnaire. Generalized linear mixed models were used to examine the change of PA level before and after COVID-19 remote learning after controlling for gender, race, and socioeconomic status. The impact of COVID-19 disruption on PA levels was also evaluated.

Results: Apple Watch wear compliance declined from 265 students' available data per week before COVID to 154 students wearing it per week after COVID. Students' PA levels declined significantly after COVID-19 university shutdown (before=9283; after=6328; $p<.01$). Females were significantly more active than male college students before COVID but the gender difference attenuated from 1162 steps/day before to 502 steps/day afterwards ($p<.01$). The significant weekday vs weekend PA variation (weekday: 9355 vs weekend: 8258; $p<.01$) was also attenuated and reversed after COVID (weekday: 5968 vs weekend: 6430; $p>.05$). Male students who had higher confidence in the government handling of COVID or felt much more disrupted became more active ($p<.01$) but female students did not.

Conclusions: These findings indicate that the stay-at-home order and remote learning are associated with decreased PA among college students. Public health efforts need to be taken to help them be physically active during COVID-19 while remaining safe.

Utilizing biofeedback as a behavioral change strategy in overweight and obese cancer survivors to promote physical activity: A focus group analysis

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Special Interest Group: D. e- & mHealth (SIG)

Purpose: Recent advances in wearable biosensor technology show that continued monitoring of personal biological data is increasingly accessible, laying a foundation for providing biologically based feedback. Biofeedback could be used as a behavioral change strategy to motivate physical activity (PA) engagement by demonstrating the acute impact of PA. This study examined how insufficiently active overweight/obese cancer survivors perceive glucose-based biofeedback as acceptable and helpful for promoting PA.

Methods: Sixteen insufficiently active overweight/obese cancer survivors (aged 50-74) were recruited from a local tumor registry and interviewed (between November 2019 to September 2020) across five focus groups. In each focus group, discussion started with PA-related topics (e.g., goals, benefits, barriers). Then, the moderator highlighted the acute impact of PA using a simulated website demonstrating glucose patterns in response to walking and showed a Fitbit device that can track PA and a continuous glucose monitor (CGM) that can track glucose. Participants discussed their opinions on these two wearable sensors and their feelings and preferences about sample feedback messages based on data from these devices. Multiple coders read and analyzed the transcribed data totaling 314 pages using Braun & Clarke's (2006) process focusing on identification, analysis, organization, description, and reports.

Results: All participants expressed the need to become more physically active, identifying lack of motivation centering on their survivorship experiences and symptom management as the most salient barrier. They indicated familiarity with activity trackers (i.e., Fitbit) and expressed interest in biosensors (i.e., CGMs) as CGMs show biological metrics in real-time. Participants reported that (1) glucose data is a relevant and important health indicator; (2) integrated messages (between Fitbit and CGMs) are useful in demonstrating how their behaviors immediately impact their body; and (3) this information is motivating for them to modify their behaviors.

Conclusions: This study supports the use of wearable biosensors and m-health interventions to promote PA in cancer survivors. Glucose-based biofeedback provides relevant and motivating information for cancer survivors regarding their daily activity levels by demonstrating the immediate effects of PA. Integrating biofeedback into PA interventions could be an effective behavioral change strategy to promote a healthy lifestyle in cancer survivors.

A mHealth intervention in children with overweight and obesity and their parents: Findings from a pre/post study

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Special Interest Group: D. e- & mHealth (SIG)

Purpose: The growing number of studies about mobile health (mHealth) interventions suggests their promising potential to promote a healthy lifestyle, but less is known about their effectiveness in the long term. Aim2Be is a mHealth app that strives to promote healthy behaviors among children and their families. This study aimed at evaluating changes in adiposity and health behaviours among children with overweight and obesity and their parents, after using Aim2Be for 6 months.

Methods: A single group of 107 child-parent dyads recruited through Facebook and various clinical settings across Canada, had access to the Aim2Be app for 6 months. Assessments at baseline, 3 and 6 months included self-reported health behaviours (physical activity, screen time, intakes of vegetables, fruits and sugary beverages), online 24-hour dietary recalls, steps per day assessed with a Fitbit and measured height and weight. Covariates-adjusted mixed effect models evaluated changes in outcomes at 3 and 6 months. Change over time was evaluated in relation to app use (total minutes spent in the app at 3 and 6 months) by including time by app use interaction terms.

Results: Significant time by app use interactions were identified for three outcomes. Children's and parents' use of Aim2Be was on average of 93(SD=135) and 76(SD=81) minutes at 3-months, increasing to 106(SD=151) and 94(SD=103) minutes at 6-months, respectively. Among children, energy from sugary beverages slightly decreased ($p=0.015$) from baseline to 3-months and remained unchanged at 6-months (mean 58, 53, and 54 kcal/day at baseline, 3- and 6-months, respectively). Among parents, time spent walking increased ($p=0.019$) from baseline to 3-months, but returned to baseline levels at 6-months (32, 40, and 30 min/day at baseline, 3- and 6-months, respectively). Finally, parents' screen time decreased ($p=0.033$) at 3-months and remained unchanged at 6-months (147, 132, and 135 min/day at baseline, 3- and 6-months, respectively). No changes were observed for the other outcomes.

Conclusions: Overall, limited changes in health behaviours were observed among participants during a 6-month period of using Aim2Be. More rigorous study designs are needed to evaluate the potential efficacy of mHealth interventions for children with overweight and obesity.

Promoting physical activity in Latino men with a tailored e-health intervention: Final results of the Hombres Saludables feasibility trial

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Special Interest Group: D. e- & mHealth (SIG)

Introduction: U.S. Latino men are disproportionately affected by health conditions related to low physical activity (PA). Engaging in regular PA can yield many health benefits; yet, few Latino men meet national guidelines. Moreover, there is a paucity of PA interventions developed for Latino men.

Methods: Hombres Saludables is a pilot randomized trial evaluating the efficacy of a 6-month Spanish language, individually tailored web- and text-based PA intervention for Latino men. We engaged men in 8 focus groups to adapt an evidence-based internet PA intervention originally for Latinas. The new intervention included: an interactive website with PA tracking, goal setting and individually tailored PA content; automated text messages; two check-in calls, pedometer; gym membership and access to private Facebook group. Study participants were randomized to either the PA intervention arm or attention control arm focused on nutrition and wellness. Participants completed questionnaires at baseline and 6-months (e.g., self-efficacy, decisional balance, social and environmental PA determinants). PA was assessed via accelerometer and 7-Day PA Recall.

Results: 38 men were randomized to the Intervention (N=23) or Control (N=15). Participants were predominantly Dominican (21%) or Guatemalan (13%), with 63% reporting at least some college education. Average age was 38.6 years (SD=12.43) and 58% were employed full time. Retention rates were 91.3% for Intervention and 100% for Control arms. Intervention participants increased self-reported MVPA from a median of 0 min/week (IQR=45) at baseline to 105 min/week (IQR=295) at 6m, vs. Control participants (0 min/week (IQR=60) at baseline to 30 min/week (IQR=152) at 6m). Quantile regression models indicate a trend towards significance in 6m PA outcomes between arms controlling for baseline, $p=.10$. Trends also suggest that a higher proportion of Intervention participants met ACSM PA guidelines (at least 150 min/week of MVPA) at 6m, OR=3.22, 95% CI: .95-13.69 (42.1% of intervention participants vs. 26.7% of wellness participants). Follow-up interviews indicated that the intervention was acceptable and provided ideas for future interventions.

Conclusions: Findings from this feasibility trial suggest that an individually tailored e-health intervention can successfully increase MVPA in low-active Latino men. Such interventions have the potential for broad dissemination.

Social support increases children's use of an e-health behaviour modification app

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Purpose: Children's health behaviours (diet, physical activity and screen time) that are associated with obesity fall below health recommendations. Electronic health (e-health) interventions may be ideally suited for children as their use of smartphones are on the rise. However, the use of e-health apps remains low among children and little is known about what factors may promote engagement. This study explored how social support from parents and an interactive live health coach as well as app satisfaction and baseline motivation for changing health behaviours influenced children's time spent in a lifestyle behaviour modification app (namely Aim2Be).

Methods: A secondary analysis of 174 children-parent dyads who were provided access to the Aim2Be app for at least 3-month was conducted. Aim2Be is a gamified lifestyle behaviour medication app grounded in theories of behaviour change (developed by the Childhood Obesity Foundation, BC Canada). Online questionnaires assessed demographic characteristics of participants as well as children's baseline motivation to change the health behaviours targeted by the app (diet, physical activity and screen time) as well as app satisfaction. Web-analytics tracked parents' use of the app (parent support – total minutes), children's engagement with an interactive live health coach (coach support – yes/no interaction with coach) and total minutes children spent in the app. Regressions were used to explore associations between children's app satisfaction, baseline motivation for health behaviours, parent support and engagement with the interactive live health coach on time spent in the app. Bootstrapping techniques (5000 iterations) using full information maximum likelihood were employed to account for missing data. All models controlled for relevant covariates.

Results: Children's app satisfaction ($\beta=.44$), parental support ($\beta=.24$), and coach use ($\beta=.15$) were significantly associated with minutes children spent using the Aim2Be app. No significant associations between baseline motivation of health behaviours and time spent in the app were detected.

Conclusions: The inclusion of different social components and social support within e-health apps may encourage app use among children. Increasing children's engagement and satisfaction with e-health apps could play a key role in encouraging the adoption of health behaviours.

How do we know what to say? Refinement of a Bank of Messages Targeting Diet and Physical Activity Through End-User Evaluation

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Special Interest Group: D. e- & mHealth (SIG)

Purpose: Given the increasing reliance on mobile technologies and widespread use of short messaging services (SMS) as a communication strategy, SMS provides an opportunity to improve the delivery of healthcare virtually. SMS has been shown to be an effective way to reach a broad audience engaging in physical activity and dietary interventions. However, limited evidence exists regarding the development or receptivity to SMS content. Understanding how interventions are developed is necessary for future research to implement effective SMS interventions.

Methods: The study design consisted of two phases. 1) Evaluation: Five SSBC trainers and 13 past SSBC participants were asked to review a bank of 124 SMS messages using a 5-point Likert scale on readability, usefulness, and relevance. Each message was followed by an open text box for suggestions on improvements. 2) Refinement: an average score was calculated for each message (ranging from 3-15). Any message with a score <14 was refined using participant feedback.

Results/findings: On average, messages received a score of 13.77/15±0.76, with SSBC trainers scoring messages 0.81 higher than did past participants. Questions received an average of 2.6 suggestions for improvement (range=0-5). 60 messages received a score <14 and were edited based on feedback from participants; 23 messages received a score >14 but had multiple suggestions so were refined based on feedback; 11 messages received consistent critique revolving around applicability to the program and were removed.

Conclusions: This study involved the evaluation and refinement of a bank of SMS messages which are suitable for use following the SSBC program. These messages are based on behaviour change theory and have been refined based on feedback from those with lived experiences as diabetes prevention program trainers and participants. The message bank, that was positively assessed by those representative of future message senders and recipients, will prompt participants to adhere with the diet and exercise changes they made during the SSBC program.

**O3.33 - Impact of food claims, labelling, policy and subsidy across
populations,
June 10, 2021**

The quality of food labelling information provided on leading Canadian grocery websites

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Special Interest Group: H. Policies and environments (SIG)

Purpose: The COVID-19 pandemic has rapidly increased online grocery shopping among Canadians; however, little is known about the functionality of e-commerce grocery retail websites and the availability of mandatory labelling information.

Methods: Eight leading grocery retail websites in Canada were independently evaluated by 2 researchers. A random sample of fresh and prepackaged products (n=85) were searched on each website to assess the availability and quality of key labelling information.

Findings: All 8 websites required a member profile, with 2 requiring a membership fee. Five websites offered pick-up (minimum purchases \$30-\$50 (n=4); fees \$2.97-\$5.00 (n=3)) and 7 delivery (minimum purchases \$35-\$50 (n=4); fees \$7.97-\$11.99). Seven websites showed order history and 5 saved lists to allow consumers to easily purchase pre-selected foods. Among 17.5±4.9 (mean±SD) food categories, Fruits & Vegetables (5 websites), Prepared Foods (5), and Meat & Seafood (4) were the most commonly used. On all 8 websites, common product information included product images, brand, name, size, price, and delivery/pick-up information. Front-of-pack images were available (99.5%), while back-of-pack and other sides of pack images were not readily available (14.5% and 3.4%, respectively). Nutrition Facts table was available 70.7% of the time (range: 0-93.3%), but needed to scroll-down (36.0%) or click a link (38.9%) or viewed as a product image (25.1%). Ingredient information was available 78.7% (range: 65-100%), without needing to scroll (0.6%), after scrolling down (23.8%), one click (66.3%) or as a product image (10.2%). Allergen information was available 53.3% of the time (range: 0-68.8%), without scrolling (0.9%), after scrolling down (12.4%), one click (67.3%), or as a product image (19.5%). Health and nutrition claims were part of the product description 49.4% of the time (range: 21.0-96.7%) with 3 websites using company-specific symbols to represent other product characteristics (e.g., gluten-free, no artificial) and 3 websites provided a consumer-driven 5-star rating system. Date markings were not available on any websites.

Conclusions: Although online grocery websites may provide a convenient shopping method, the inconsistencies and low availability of mandatory labelling information can be barriers to consumers making informed purchasing decisions. Policies and guidelines to standardize the e-commerce retail environment are needed.

The Influence of School Food Policy and School Garden Prevalence Across Four New Jersey Cities

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Special Interest Group: H. Policies and environments (SIG)

Purpose: School garden programs are commonly implemented to influence children's health behaviors, but current research lacks longitudinal and school level data. In this study, we examine the prevalence of school gardens by school level factors in elementary, middle and high schools across 4 New Jersey cities between the school years (SY) 2010-2011 to SY 2017-2018. We use these findings to further examine whether changes in the school food environment through the implementation of the Healthy Hunger Free Kids Act (HHFKA) of 2010 influenced these trends.

Methods: This study uses data from the New Jersey Child Health Study (NJCHS), which was uniquely positioned to collect longitudinal data pertaining to school garden prevalence before and after school food environments changed due to implementation of the HHFKA. The NJCHS 96-item survey provided detailed food and physical activity environment data, which included school garden presence, from SY 2010-2011 to SY 2017-2018 in public schools across 4 New Jersey cities: Camden, Newark, New Brunswick, and Trenton (n=775). Bivariate analyses were conducted through t-tests and chi-squared tests. Multivariate analyses were conducted to determine the unique contribution of various school level characteristics.

Results/Findings: Although the prevalence of school gardens did not show any significant changes from SY 2010-2011 to SY 2017-2018 or pre- and post- HHFKA implementation, a slight increasing trend was observed among all school levels. Bivariate analyses showed significant associations with student demographic data. Schools with gardens were significantly associated with a larger proportion of African-American students (56.5%, $p < 0.0001$) and a smaller proportion of Hispanic students (38.4%, $p < 0.0001$).

Conclusions: School garden prevalence was not influenced by school food policy implementation and associated changes to the school food environment. Despite a lack of significant associations between school garden prevalence and school level, the significant findings of garden presence within schools with larger proportions of African-American students shows potential in addressing health disparities by increasing access to interventions that may affect health behaviors in a historically at-risk population. The significant relationship between school garden prevalence within schools with a smaller proportion of Hispanic students shows opportunity for wider implementation to equitably promote health behaviors.

The impact of toddler milk claims on beliefs and misperceptions: A randomized experiment with parents of young children.

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Special Interest Group: H. Policies and environments (SIG)

Purpose Toddler milks are ultraprocessed milk-based drinks marketed for children ages 12-36 months, which contain added sugars and may contribute to unhealthy dietary patterns. Marketing spending on toddler milks has increased in the United States, and toddler milks often have structure/function claims (i.e., statements that describe how an ingredient or nutrient affects the structure or function of the human body) on product packaging that are potentially misleading. This study examined how structure/function claims affect parents' beliefs and perceptions about a toddler milk product.

Methods Between May and July 2020, we recruited 2,218 US parents of children ages 1-5 years for an online survey. Participants were randomly assigned to view a toddler milk package for a product sold outside of the United States with either an unrelated claim ("new and improved", control), a "brain development" claim (i.e., "brain" claim), or an "immunity-related" claim (i.e., "immunity" claim). We examined perceptions, intentions, and beliefs about a toddler milk product between claim conditions using linear regression for continuous outcomes and logistic regression for dichotomous outcomes.

Results. Parents who were exposed to the "brain" claim or the "immunity" claim were more likely to incorrectly believe that the toddler milk was as healthy or healthier than cow's milk, compared to those who saw the control claim (89% for "brain" claim, 87% for "immunity" claim, and 79% for control, $p < .001$ for both comparisons). Parents exposed to either the "brain" or "immunity" claim had higher intentions to give the toddler milk to their child, higher perceived product healthfulness, and stronger beliefs that pediatricians would recommend the product compared to parents exposed to the control (all p 's $< .001$).

Conclusions. These findings suggest that structure/function claims on toddler milks packaging may mislead parents and increase the appeal of toddler milks. These findings support calls for public health policies to regulate marketing on toddler milks packaging to prevent misperceptions among parents.

Impact of a farmers' market healthy food subsidy on diet quality of low-income adults in British Columbia, Canada: A randomized controlled trial

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Special Interest Group: H. Policies and environments (SIG)

Purpose: Low-income populations have disproportionately lower diet quality than their higher income counterparts. Farmers' market healthy food subsidies are promising interventions to improve dietary patterns among low-income populations. In Canada, the British Columbia Farmers' Market Nutrition Coupon Program (FMNCP) provides coupons to low-income households to purchase healthy foods from farmers' markets. Program impacts on dietary outcomes among participants remain to be examined. Thus, the present study aimed to assess the impact of the FMNCP on the diet quality of low-income adults.

Methods: Low-income adults were randomized to a FMNCP intervention group (n= 126) or a no-intervention control group (n= 116). The FMNCP group received 16 coupon sheets valued at \$21/sheet over 10–15 weeks to purchase fruits, vegetables, dairy, meat, fish, eggs, and nuts/seeds from farmers' markets. Both groups completed a questionnaire to report sociodemographic characteristics and health-related variables and two 24-hour dietary recalls (using the Automated Self-Administered 24-hour Dietary Recall) at baseline (0 weeks), post-intervention (10–15 weeks), and 16 weeks post-intervention (26–31 weeks). Diet quality was calculated using the Healthy Eating Index-2015 (HEI-2015). Total HEI-2015 scores can range from 0-100, with a higher score indicating higher diet quality. Repeated measures mixed-effect linear regression assessed differences in total HEI-2015 scores between the FMNCP and control groups at post-intervention and 16 weeks post-intervention, adjusting for baseline values of the outcome.

Results: There were no significant differences in total HEI-2015 scores (mean \pm standard error) between the FMNCP and control groups at post-intervention (61.9 ± 1.13 vs 62.3 ± 1.14 ; $p=0.88$) or at 16 weeks post-intervention (59.8 ± 1.13 vs 59.5 ± 1.18 ; $p=0.78$).

Conclusions: To our knowledge, this was the first randomized controlled trial to assess the impact of a farmers' market healthy food subsidy on diet quality among low-income adults. This study demonstrated that a farmers' market healthy food subsidy delivered over 10-15 weeks did not significantly impact diet quality among participants. Study findings

suggest that a short-term subsidy may not be sufficient to produce meaningful changes in diet quality among low-income adults. Ongoing research is needed to identify effective policy interventions to reduce dietary inequities among low-income populations.

Perceptions of the healthfulness of beverages among youth from six upper-middle- and high-income countries: findings from the International Food Policy Study

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Special Interest Group: H. Policies and environments (SIG)

Purpose: This study aimed to examine perceptions of healthfulness and sugar content of different beverage types among youth in various country contexts.

Methods: A cross-sectional online survey was conducted among 11,108 youth ages 10-17 in Australia (n=1,435), Canada (n=3,682), Chile (n=1,252), Mexico (n=1,616), the United Kingdom (UK; n=1,520) and the United States (US; n=1,603) in November/December 2019 as part of the International Food Policy Study. Youth were shown an image of a branded bottle of soda and then randomized to view one additional branded beverage type (diet soda, 100% juice, energy drink, water, sports drink, chocolate milk, iced tea or unflavoured milk). Participants were asked whether the beverage was healthy or unhealthy, and how much sugar it contained. Descriptive analyses examined the proportion of the sample who perceived each beverage as healthy (either 'healthy' or 'very healthy') and high sugar content ('quite a bit' or 'a lot' of sugar). Logistic regression examined whether beverage perceptions varied by country, adjusting for sociodemographic factors.

Results/findings: Across all 6 countries, 2% of youth reported the soda was healthy (range 0.3% in Chile to 4% in the US) and 88% reported the soda had high sugar content (range 84% in the US to 91% in Chile). In all 6 countries, water was most commonly rated as healthy (96%), followed by milk (84%), 100% juice (72%), chocolate milk (28%), sports drinks (21%), iced tea (17%), diet soda (7%) and energy drinks (5%). Energy drinks were most commonly perceived as having high sugar content (72%), followed by chocolate milk (40%), iced tea (40%), sports drinks (38%), 100% juice (28%) and diet soda (28%). Milk and water were rarely perceived as high in sugar (4% and 6%, respectively). Perceptions of healthfulness and sugar content differed between countries for soda, 100% juice, sports drinks, chocolate milk, iced tea and unflavoured milk. Socioeconomic differences will be discussed.

Conclusions: Youths' health-related perceptions of beverages differed across countries, and were often discordant with the objective healthfulness and sugar content of beverages. Policy interventions that effectively communicate the sugar content of beverages may help youth identify more healthful beverage choices.

**O3.34 - Eating behavior and weight status among children,
June 10, 2021**

Differences in participant group characteristics at baseline dependent on recruitment strategy: Results from the Aim2Be randomized controlled trial

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Special Interest Group: G. Children and families (SIG)

Purpose: The purpose of this study was to compare baseline differences in demographics and health behaviours of participants from a randomized controlled trial (Aim2Be) that included recruitment through either pediatric obesity management clinics (clinical) or social media (Facebook) using a targeted advertisement.

Methods: A two-arm waitlist control study design was used. Participants were parent-child dyads with a child aged 10-17 years living with overweight or obesity. Demographic differences between participants recruited from Facebook and from clinical settings were evaluated using Student's t-tests and chi-square tests for continuous and categorical outcomes, respectively, using a $p < 0.01$ to account for the possibility of a Type I error. Linear regression models assessed group differences in children's and parents' health behaviours, motivation, self-efficacy, parenting practices, and quality of life after adjusting for covariates (sex, age, income, ethnicity, parental education, household income, parents' marital status, and previous family participation in a weight management program).

Results: Compared to families recruited through weight management clinics ($n=95$), participants in the Facebook group ($n=123$) were younger ($M=42$ vs $M=46$ years, $p < 0.001$), had younger children ($M=12$ vs $M=14$ years, $p < 0.001$), were more likely to have a male child (57% vs 37%, $p=0.003$), and identify as white (70% vs 52%). Participants recruited through clinical sites were more likely to have participated in a weight management program ($p=0.000$) and have higher intentions to participate in such a program in the future ($p=0.000$) than Facebook participants. Baseline characteristics of participants did not differ; however a few variables were borderline significant ($p < 0.05$). With respect to lifestyle behaviours, Facebook participants reported a higher mean daily caloric intake ($M=2236$ SD=727 vs. $M=1875$ SD=705; $p=0.014$) and lower min/week of physical activity ($M=299$ SD=47 vs. $M=319$ SD=165; $p=0.022$) than clinical site participants. Children's and parents' health behaviours, motivation, self-efficacy, parenting practices, and quality of life did not significantly differ.

Conclusions: Demographic and behavioural characteristics differed depending on the source of recruitment for this trial. While participants recruited through social media are prime participants for lifestyle behaviour interventions, these participants may differ from a clinically recruited population at baseline, which may influence results.

Maternal modeling online: Assessing the dynamics of mother/daughter dyads on social networking sites using the actor-partner interdependence model

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Special Interest Group: G. Children and families (SIG)

Purpose: Explore the dynamics of mother/daughter dyads on social networking sites (SNSs) and the influence of mothers' SNS use on various psychosocial health variables in their daughters.

Methods: 40 mother/daughter dyads completed individual, online surveys which utilized parallel questions. Predictor variables included overall SNS use, photo activities, and interaction activities. Outcome variables included Rosenberg Self-Esteem Scale (RSES), Body Shape Satisfaction Scale (BSSS), Sociocultural Attitudes Towards Appearance Questionnaire-4 (SATAQ-4), Children's Eating Attitude Test (ChEAT)/The Eating Attitudes Test (EAT-26), and questions to determine physical activity behaviours. Data were analyzed using a pooled regression actor-partner interdependence model.

Results/findings: Actor effects were significant for both mothers and daughters. For the daughter partner effects, eight relationships were significant: 1) Overall SNS use and RSES ($t = -2.28, p < .05$), 2) Overall SNS use and BSSS ($t = -2.50, p < .05$), 3) Overall SNS use and SATAQ-4 ($t = 4.47, p < .05$), 4) Overall SNS use and EAT-26/ChEAT ($t = 4.59, p < .05$), 5) SNS photo activities and SATAQ-4 ($t = 4.03, p < .05$), 6) SNS photo activities and EAT-26/ChEAT ($t = 3.92, p < .05$), 7) SNS interaction activities and RSES ($t = 2.46, p < .05$), and 8) SNS interaction activities and RSES ($t = -3.83, p < .05$). None of the mother partner effect were statistically significant.

Conclusions: The present study delivers a better understanding towards the dyadic relationships between SNS behaviours and self-esteem, body satisfaction, societal and interpersonal aspects of appearance ideals, eating disorder symptoms/concerns, and physical activity behaviours among mothers and their early adolescent daughters. Findings suggest that mothers need to foster positive SNS behaviour, and that greater emphasis should be placed on discouraging negative modelling behaviours online.

Classify weight status in adolescent girls: does biological maturity matter?

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Special Interest Group: G. Children and families (SIG)

Purpose: In efforts to combat pediatric obesity and identify children at high-risk, physicians and health professionals widely practice screening and classifying weight status using age- and sex-specific body mass index (BMI) percentiles [Herman et al., 2009]. However, maturation-related misclassification may result in overestimations of overweight prevalence rates among early maturing adolescents, and underestimations among later maturing adolescents [Pietrobelli, 1998 & USPSTF, 2017]. The purpose of this investigation is to determine the rate of occurrence of misclassification of weight status among young girls due to standard chronological age-and-sex matched reference data at age 12.

Methods: Females (n=221) in grades K-8 participated in school health screenings of body mass and stature annually from 2006-2020. Age-and-sex-specific BMI percentiles were calculated at age 12, and weight status was determined based on CDC growth charts. Height velocities were graphed based on longitudinal data from age 8-14 years to determine somatic maturity (biological age) based on age at peak height velocity. The number of participants whose weight status was misclassified at age 12 when adjusted for biological age was determined.

Results/Findings: Twenty-seven percent of participants were classified as overweight (13%) and obese (14%) at age 12 based on chronological age (11.9 ± 0.2 years). The distribution of early, average, and late maturers was 38%, 34%, and 28%, respectively. When adjusting for biological age (12.1 ± 0.9 years), 6% (14/221) of participants were reclassified, with 1.4% obese participants reclassified as overweight, and 2.3% overweight participants reclassified as normal weight. Underestimations were also seen with 2.3% normal weight participants reclassified as overweight and 0.5% overweight participants reclassified as obese.

Conclusions: Our study found only 4% of girls were reclassified into a lower weight category; thus maturation does not appear to influence or misclassify in young girls. These results are in conflict with a previous study (Gillison et al., 2017) which found 22% of overweight or obese girls were reclassified into a lower weight category when adjusting for maturity.

Development of child appetite: Tracking and age-related differences in eating behaviors in infancy and childhood

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Special Interest Group: G. Children and families (SIG)

Purpose: Appetitive traits in children, measured by the Child Eating Behavior Questionnaire (CEBQ) and Baby Eating Behavior Questionnaire (BEBQ), predict body weight and are heritable. However, much is still to be learnt about how appetitive traits evolve through development. Here we investigate tracking (i.e. persistence of rank order over time) and age-related differences in eating behaviors as assessed in childhood and infancy.

Methods: We used data from our ongoing cohort study, Resonance, on CEBQ (8 sub-scales: food responsiveness, enjoyment of food, emotional overeating, desire to drink, satiety responsiveness, slowness in eating, food fussiness, emotional undereating) assessed in children 2-15 years, and BEBQ (4 sub-scales: food responsiveness, enjoyment of food, satiety responsiveness, slowness in eating) assessed in children 1-17 months. Cross-sectional Pearson correlations of appetitive traits and age were tested for all participants with at least one observation (CEBQ: n=294, BEBQ: n= 153). In addition, we sourced children's first and second observations of the CEBQ (n=118) and BEBQ (n=36) to test tracking within individuals (paired correlations) and age-related differences within individuals (paired t-tests).

Results/findings: CEBQ correlations with age suggested that satiety responsiveness, slowness in eating, and desire to drink decreased with age ($r=-.172$, $p=.003$; $r=-.296$, $p<.001$; $r=-.234$, $p<.001$), while emotional overeating increased with age ($r=.228$, $p<.001$). Paired t-tests also supported an increase in emotional overeating with age within individuals ($M: 1.55$ vs. 1.71 , $p=.002$). All CEBQ sub-scales demonstrated high tracking ($r=.503$ to $.751$, $p<.001$). BEBQ correlations with age suggested that slowness in eating decreased with age ($r=-.212$, $p=.008$). Paired t-tests did not reveal any age-related differences. Satiety responsiveness, but not the other BEBQ sub-scales, showed high tracking ($r=.436$, $p=.008$).

Conclusions: Initial findings from the Resonance cohort suggest that food avoidant traits are negatively related with age, and that emotional overeating increases with age. All appetitive traits showed tracking within individuals through childhood, and satiety responsiveness tracked through infancy. Further research into how these traits evolve through development could help parents know what to expect, facilitate intervention development, and stimulate research into environmental and biological contributions to appetite development.

Impact of the COVID-19 Pandemic on Children's BMI: An interrupted time-series study

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Special Interest Group: G. Children and families (SIG)

Purpose: The coronavirus disease-2019 (COVID-19) pandemic led to the closure of schools around the world. The structured days hypothesis posits that the school day regulates children's engagement in obesogenic behaviors and, in turn, weight status. This study evaluated the impact of COVID-19 related school closures on children's body mass index z-score (zBMI).

Methods: This interrupted time-series study included two elementary/primary schools in the United States. Schools closed on March 16th, 2020, and did not reopen until the following school year (i.e., September 9th, 2020). Height and weight were collected from children (N=1804, mean age=8.8 years SD=2.1, 51.3% male, 64.6% Black) each August/September from 2017-2020. BMI was calculated and transformed into zBMI. Mixed-effects linear regression estimated yearly zBMI change prior to (i.e., 2017-2019) and in the year of pandemic school closures (i.e. 2019-2020). Subgroup analyses by sex, race (i.e., Black, White, other race), weight status (World Health Organization defined overweight or obese [OWOB] and normal weight), and grade (i.e., lower=kindergarten-2nd grade, and upper=3rd-6th grade) were conducted.

Results/findings: Prior to pandemic school closures children's yearly zBMI change was +0.03 (95CI=-0.10, 0.15). Change in the year of the pandemic school closures was +0.34 (95CI=0.21, 0.47), representing an acceleration in zBMI change of +0.31 (95CI=0.19, 0.44). For girls, zBMI change accelerated by +0.26 (95CI=0.12, 0.40) during the pandemic year, while boys experienced an acceleration of +0.35 (95CI=0.20, 0.50). Acceleration in zBMI change was observed for Black (+0.39, 95CI=-0.22, 0.55), White (+0.20, 95CI=0.06, 0.35), and those identified as another race (+0.34, 95CI=0.06, 0.61) during the pandemic year. For children classified as normal weight prior to the pandemic zBMI change accelerated by +0.52 (95CI=-0.38, 0.67) while it did not accelerate for children classified as OWOB prior to pandemic (-0.03 (95CI=-0.14, 0.08). Yearly zBMI change accelerated for lower elementary/primary (+0.25, 95CI=0.12, 0.38) and upper elementary/primary children (+0.37, 95CI=0.19, 0.54).

Conclusions: In this sample zBMI accelerated for all children, except for children classified as OWOB prior to the pandemic. If similar zBMI accelerations occurred for children across the world, public health interventions to address this rapid unhealthy BMI gain will be urgently needed.

Changes in Elementary Schoolers' Dietary Intake During the COVID-19 Pandemic Compared to Preceding Years

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Special Interest Group: G. Children and families (SIG)

Purpose: The COVID-19 pandemic led to school closures, food shortages, and shifted food purchasing, each of which may have altered children's dietary intake. This longitudinal quasi-experimental study examined children's dietary habits during the 2020 COVID-19 pandemic compared to the same calendar periods in 2018 and 2019.

Methods: Parents of 231 elementary schoolers (ages 7-12) from a larger cohort completed the Beverage and Snack Questionnaire on 2-3 random days each week for 6 weeks in Spring (April/May) and Summer (June/July). Foods were classified as healthy (i.e., fruit, vegetables, unsweetened dairy) or unhealthy (i.e., convenience foods, sweets/desserts, salty snacks, sugar-sweetened beverages) based on the Healthy Eating Index. Mixed models were used to compare differences in means and changes in slope between years, accounting for age, sex, and race.

Results: Before the pandemic (2018 to 2019), there were no significant changes in springtime consumption of either healthy ($B = 0.10$ 95CI 0.00 to 0.10) or unhealthy ($B=0.06$, 95CI -0.12 to 0.24) foods. In spring 2020, both healthy and unhealthy food consumption increased significantly; children consumed an extra 0.3 (95CI 0.16 to 0.45) healthy and 1.2 (95CI 0.96 to 1.50) unhealthy foods/day. Summertime consumption of healthy and unhealthy foods was already increasing prior to the pandemic ($B=0.12$, [95CI 0.03 to 0.12] and $B=0.46$ [95CI 0.28 to 0.63], respectively). Healthy food consumption accelerated by an extra 0.2 (95CI 0.06 to 0.34) foods/day during the pandemic. While there was a significant increase in unhealthy foods consumed during the pandemic compared to previous years, the relative increase was not greater than expected given previous trends in summer eating habits ($B=0.23$, 95CI -.04 to .50).

Implications: Increased unhealthy food consumption during the pandemic is concerning given the risk for weight gain. Increases in summertime unhealthy food consumption, even prior to the pandemic, highlight the risk of unhealthy weight gain during summer vacation. The pandemic school closures may have altered children's health behaviors by mimicking an 'extended summer vacation,' devoid of external structure. This may contribute to a population-wide increase in childhood obesity, warranting public health intervention.

**O3.35 - Implementation and evaluation population-based health
promotion strategies,
June 10, 2021**

Impact of Risk of Generalizability Biases in Pilot and Larger-Scale Adult Obesity Trials: A Meta-Epidemiological Review

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Special Interest Group: E. Implementation and scalability (SIG)

Background: To inform scaling decisions, pilot/feasibility studies must be free of biases. The Risk of Generalizability Biases (RGBs), a set of biases for behavioral interventions, focus on factors introduced during early-stage studies that can lead to inflated early effects and large-scale disappointments. RGBs include researchers delivering an intervention (delivery agent bias), providing unscalable levels of support for implementation (implementation support bias), delivering the intervention to a non-representative audience (target audience bias) or testing an intervention for shorter durations than intended in the larger-scale trial (duration bias). The purpose of this study was to identify the presence and impact of RGBs in behavioral interventions that have a published pilot and larger-scale trial on a topic related to adult obesity.

Methods: First, searches were conducted across 5 databases to identify systematic reviews/meta-analyses of behavioral interventions on a topic related to adult (>18yrs) obesity (e.g., weight loss/management, improve activity/diet); Second, studies included within reviews were searched for reference to early-stage work; Third, published pilot/feasibility studies were confirmed as the early-stage study informing the published larger-scale trial. RGBs were coded in the pilot and larger-scale trial pairs, along with quantitative extraction of outcomes. Multi-level meta-regression models were used to examine the impact of the presence/absence of RGBs on the change in the standardized mean difference (SMD) from pilot to larger-scale trial.

Results: A total of 114 pairs, representing 230 studies, were identified. The four most prevalent RGBs were duration (33%), delivery agent (30%), implementation support (23%), and target audience (22%) bias. The presence of the biases in the pilot and absent from the larger-scale trial was associated with a reduction in the SMD from pilot to larger-scale trial ranging from -49% to -77%, compared to a reduction in the SMD ranging from -31% to -38% for pairs without these biases.

Conclusions: The presence of RGBs in early-stage studies contributes to inflated effects, potentially leading to premature testing of behavioral interventions in larger-scale trials. Removal of RGBs in the design and execution of early-stage studies is critical to evaluate whether a behavioral intervention is ready for larger-scale testing.

Food Bank and Health Care Partnerships: A cross-sector approach to supporting families experiencing food insecurity

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Special Interest Group: E. Implementation and scalability (SIG)

Purpose: Partnerships between charitable food systems and health care systems have been forming across the country to support individuals and families experiencing food insecurity, yet little research has been given to the unique implementation challenges or essential practices of these partnerships, particularly from a food bank perspective. The purpose of this study was to describe existing implementation challenges and essential practices to facilitate equitable partnerships between food bank systems and health care systems.

Methods: Semi-structured interviews were completed with food bank leaders and food insecurity experts (n=6). Interviews focused on understanding existing partnerships, barriers to implementation and sustainability, and facilitators to sustainable program development. Notes were taken during interviews and then discussed with the research team. Themes were generated through iterative discussions of interview notes.

Results: Results suggest unique implementation challenges exist at all levels of food bank/healthcare partnerships including the partnership, program, and system levels. Partnership-level implementation challenges focused on issues of scale and data collection, sharing, and analysis. Program-level implementation challenges focused on food and produce expectations, while structural-level implementation challenges included issues of food safety, subsidized food regulations, and patient privacy. Participants also identified essential practices of partnerships between food banks and health care systems that will support sustainable and equitable partnerships such as the necessity of leadership support for social determinants of health, mission compatibility, food insecurity training, and partnership champions.

Conclusions: Although significant implementation challenges exist for food bank/health care partnership, sustainable and equitable partnerships that support the physical and social health of families at risk of food insecurity are possible. To support the development of this work, a systematic approach to understanding partnership models is needed. Further, leaders of healthcare systems and charitable food systems should collaboratively discuss the outlined implementation challenges to facilitate the sustainable implementation of food bank/healthcare partnerships.

From start up to scale up: Choose to Move - a health promoting intervention for older adults

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Special Interest Group: E. Implementation and scalability (SIG)

Purpose: Choose to Move (CTM) is an effective, choice-based health promoting intervention for older adults co-created with government and community stakeholders. Few such interventions were scaled up; none were comprehensively evaluated across stages of scale-up. Our objectives are to describe 1) our approach to scale-up and 2) summarize our findings to date.

Methods: We embedded CTM scale-up in Yamey's (2011) conceptual framework, applying tenets of successful scale-up. For example, we used a phased and integrated approach to scale-up. Phased implementation and scale-up spanned 7 years from formative evaluation [2015] to CTM Phases 1 & 2 [2016-2017; small scale] to CTM Phase 3 (2018-2020; large scale) to CTM Phase 4 (2020-2021). We systematically adapted CTM between phases to respond to stakeholders (2017); to scale-out to rural and remote communities (2018); to reduce costs (2019) and for the COVID-19 context (2020).

Results/Findings: Our community partners implemented > 290 CTM programs that engaged > 2700 older adults across >70 sites in British Columbia. CTM Phases 1, 2 and 3 increased older adults' physical activity, mobility and social connectedness--although we experienced 'voltage drop' as scale-up proceeded. Our delivery system deemed CTM implementation was of high quality, feasible and appropriate. Critical to scale-up success: 1) an evidence-based, flexible and adaptable program, 2) committed government and community partners, 3) alignment with organizational priorities, 4) active participation of stakeholders to design, adapt and implement CTM, and 5) strong leadership and governance by our support team.

Conclusions: CTM offers a rare example of implementation to scale-up of an effective health promoting intervention for older adults. CTM can be effectively adapted for different contexts and delivery systems.

Impact of the Childcare Physical Activity (PLAY) Policy on Toddlers' and Preschoolers' Physical Activity Levels

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Special Interest Group: E. Implementation and scalability (SIG)

Purpose: To examine the impact of the Childcare Physical Activity (PLAY) policy on the objectively measured physical activity levels of young children (2-5 years) in childcare. With 8 recommendations, The Childcare PLAY policy was an evidence-informed, institutional-level document targeting children's physical activity, outdoorplay, and sedentary behaviours.

Methods: Nine childcare centres in London, Ontario participated in the cluster, randomized controlled trial. Centres in the control condition (n = 4) continued their typical daily routine, while centres in the intervention condition (n = 5) implemented the Childcare PLAY policy for 8 weeks. To assess activity levels, toddlers and preschoolers wore ActiGraph wGT3X-BT accelerometers for 5 consecutive days during childcare hours at baseline, mid- and post-intervention, and at 6-month follow-up. Raw accelerometry data were converted to 15s epochs and age- and device-specific cut-points were applied. Participants with 2+ days of > 5 hrs of wear-time at baseline and at one additional time point were included in the linear mixed effects modeling. An adjusted alpha ($p < .017$) was used to account for multiple comparison bias.

Results: A total of 128 young children (2.66 ± 0.62 years) had valid accelerometry data. The interaction between group and time was statistically significant for light physical activity, $F(3,341) = 6.73$, $p < .017$. No evidence of an association was ascertained between the PLAY policy and total physical activity, moderate-to-vigorous physical activity, or sedentary time.

Conclusions: The findings indicate the Childcare PLAY Policy was effective at increasing toddlers' and preschoolers' light physical activity. This pilot intervention appears promising for supporting some degree of physical activity among children in childcare settings; however, additional investigations are needed to explore the feasibility and effectiveness with larger and more diverse samples.

Implementation evaluation of a diabetes prevention program when delivered by a community organization

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Special Interest Group: E. Implementation and scalability (SIG)

Purpose: With type two diabetes on the rise, there is a need for more prevention programs to reach the large number of at-risk individuals. The purpose of this research was to examine the implementation process, strategies, and multilevel contextual factors as an evidence-based diabetes prevention program was implemented into two local community organization sites. In-depth reporting of implementation strategies and context are needed to support future studies.

Methods: Small Steps for Big Changes is a brief-counselling diet and exercise modification program for individuals at-risk of developing type 2 diabetes with demonstrated success. A one-year partnered planning process with a local not-for-profit community organization co-developed an implementation plan for the translation of this project. This research was guided by a pragmatic epistemology. Semi-structured interviews were conducted with community organization staff who delivered the program (n = 8), and a focus group was completed with implementation support staff (n = 5) from both community sites. Interviews were transcribed verbatim and thematically analyzed using a template approach. The consolidated framework for implementation research (CFIR) was used to guide the analysis of this study. The CFIR is a multilevel implementation determinant framework with strong theoretical heritage. Within the template approach, themes were first inductively identified to ensure salient ideas were captured, then identified themes were deductively linked to CFIR constructs.

Results: Implementation strategies used were appropriate, well-received by staff and promoted successful implementation. Several CFIR constructs were identified from all five domains: (a) process, (b) intervention characteristics, (c) outer setting, (d) inner setting, and (e) individual characteristics. Specifically, results revealed the partnered one-year planning process, program components and structure, level of support, and synergy between program and context were important factors in the implementation.

Conclusions: This study describes the strategies and contextual factors used to implement a community-based diabetes prevention program into two community sites. Successful implementation was supported by a fully engaged, partnered approach to planning, and subsequently executing, an implementation effort. The CFIR provided a thorough framework to identify and evaluate multilevel contextual factors impacting implementation. Results demonstrate a successful approach to working with a community partner to support implementation.

What is the ‘voltage drop’ when an effective health-promoting intervention for older adults—Choose to Move—is implemented at broad scale?

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Special Interest Group: E. Implementation and scalability (SIG)

Choose to Move (CTM) is an effective, choice-based health-promoting intervention for older adults. With our partners, we are scaling up CTM across British Columbia (BC), Canada using a phased approach [Phases 1 and 2 initial scale-up; 2016-17]. In Phase 3 [2018-20] we adapted CTM for broad scale-up. Adaptations enabling implementation at scale may lead to ‘voltage drop’. Therefore, we aimed to: 1) determine the impact of CTM Phase 3 on older adults’ PA, mobility and social connectedness, and 2) quantify the voltage drop. We conducted a pre-post study with 1013 older adults (72.9±6.3 yrs; 81% women) from 141 Phase 3 CTM programs delivered by two community partners in 38 BC communities. We assessed PA, social isolation, loneliness and mobility via survey at 0 (baseline), 3 (mid-intervention) and 6 (end-intervention) months. We fit mixed-effects models to describe change in each outcome. We quantified voltage drop as the percent of Phase 1/2 effect size (i.e., change from baseline to 3- and 6-months) retained in Phase 3. PA increased during the active intervention (0-3 months) in younger (60–74 yrs; +1 day/week; $p<0.001$) and older (≥ 75 yrs; +0.8 days/week; $p<0.001$) participants. PA gains were maintained in younger (+0.7 days/week) and older participants (+0.5 days/week) ($p<0.001$) at 6 months. In younger participants, social isolation and loneliness declined and mobility improved at 3 and 6 months ($p<0.05$). In older participants, social isolation and loneliness declined at 3 and 6 months, respectively ($p<0.05$), and mobility did not change significantly from baseline. In younger participants, a ‘voltage drop’ of 63% and 50% was evident for PA at 3 and 6 months, respectively, and, in both age groups, the voltage drop ranged from 20-90% for loneliness and mobility. Effect sizes for PA in older participants and social isolation in both age groups indicated greater benefit in Phase 3, compared with Phases 1/2. Although we adapted CTM for broad scale-up, its positive benefit on older adults’ health persisted. However, we noted a ‘voltage drop’ for the intervention effect, particularly in loneliness and mobility outcomes. In future, we will investigate the influence of implementation fidelity on the ‘voltage drop’.

**O3.36 - Determinants and effects of motivational variables in nutrition
and physical activity studies,
June 10, 2021**

Associations between the practice of relaxation activities and diet quality: exploring the mediating roles of eating behaviour traits and self-determined regulation of eating behaviours in the PREDISE study

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Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: While practicing relaxation activities may be positively related to better diet quality, its association with eating behaviours is unclear. This study aims to explore whether eating behaviour traits and self-determined regulation of eating behaviours mediate the association between the practice of relaxation activities and diet quality, in a sample of French-speaking adults (Québec, Canada).

Methods: A total of 418 women and 482 men, aged between 18 and 65 years and recruited as part of the PREDISE study, were considered in the analyses. Participants had to report whether they practice one or more relaxation activities (e.g., yoga or meditation). Canadian Healthy Eating Index (C-HEI) was calculated from three web-based 24h dietary recalls. Intuitive Eating Scale (IES-2), where Body-Food Choice Congruence subscale (BFCC) refers to the tendency to choose nutritious foods while respecting well-being and preferences, and Regulation of Eating Behaviour Scale, where a high self-determined motivation (SDM) score indicates an autonomous eating behaviour regulation style, were completed online. Mann-Whitney tests were conducted to compare C-HEI scores of individuals who currently engage in relaxation activities (practitioners) to those who do not (non-practitioners). Multiple regression analyses were performed to test the mediational model and bootstrapping was used to measure indirect effects (PROCESS macro version 3.3). Analyses are adjusted for sociodemographic covariables.

Results: Overall, 88 women and 43 men were practitioners, and they had a higher C-HEI score than non-practitioners (62.9 ± 13.0 vs. 55.6 ± 14.3 ; $p=0.0011$). Parallel mediation model showed significant indirect effects of practitioner status on C-HEI score through BFCC ($\beta = 1.61$, $SE = 0.41$, 95% CI: 0.86, 2.45) and SDM ($\beta = 1.25$, $SE = .34$, 95% CI: 0.61, 1.95). The direct effect was not significant ($\beta = 1.31$, $SE = 1.32$, 95% CI: 3.87, -1.25).

Conclusions: These findings suggest that while the current practice of relaxation activities can be associated with a better diet quality, this association is mainly explained by practitioners' higher intuitive eating skills and more self-determined regulation of eating behaviours. Further studies should investigate potential impacts of relaxation activities on the development and maintenance of positive eating habits. (Funded by CIHR)

Adaptive eating behaviors support improved diet quality

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Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: Improved diet quality could substantially reduce medical costs and risk of mortality due to chronic disease. Weight neutral or non-diet interventions that promote adaptive eating behaviors are becoming a growing area of practice, and thus understanding whether adaptive eating behaviors are associated with improved diet quality is essential. In addition, due to the close relation between body image and eating behaviors, body image may be an important factor in this relationship. The purpose of this study was to develop an understanding of the relationships between positive and negative body image, adaptive and maladaptive eating behaviors, and diet quality.

Methods: We recruited 288 adults 18 years and older who were living in the US using Prolific Academic. Participants completed an online survey including measures of positive and negative body image, adaptive and maladaptive eating behaviors, and a diet screener questionnaire. We ran a series of hierarchical linear regressions to assess relationships between body image and eating behavior with an overall diet quality, calcium, whole grains, added sugar, fruit, and vegetables. Next, we tested whether body image and diet quality were mediated by eating behavior.

Results: Body image and maladaptive eating behaviors were not associated with diet intake. Body-food choice congruence, an adaptive eating behavior, was associated with overall diet quality, a higher intake of whole grains and vegetables, and a lower intake of added sugar. Additional analyses indicated body-food choice congruence mediates the relationship between positive and negative body image and diet quality.

Conclusions: Our findings provide additional support for weight-neutral or non-diet interventions as adaptive eating behaviors were associated with higher diet quality. As positive body image may influence diet quality through adaptive eating behaviors, additional research may benefit from exploring indirect effects of body image on diet intake. Lastly, our findings suggest adaptive and maladaptive eating behaviors may be conceptually distinct and have qualitatively different relationships with intake. Future research may benefit from the qualitative exploration of eating behavior and diet quality and the comparison of weight-neutral or non-diet interventions with traditional behavior change interventions.

Use of Motivational Interviewing to Target Adult Caregiver Behavior in Pediatric Obesity Prevention

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Special Interest Group: **B. Motivation and behavior change (SIG)**

In the U.S., rates of pediatric overweight and obesity have increased despite positive relationships between weight and future chronic disease. Youth obesity prevention interventions that address caregiver health behavior are a promising yet poorly understood approach to enhancing outcomes via influence on children and the home environment. Dietitian-led motivational interviewing (MI) designed to address caregiver behavior, coupled with youth obesity prevention interventions targeting vulnerable families, may prove most effective at modifying behaviors. The purpose of this study was to describe preliminary effects of RD-led remote MI (RDMI), delivered to caregivers of youth enrolled in a multicomponent obesity prevention program. Low-resource dyads (caregivers and 8-9 year old youth) were enrolled in a 10-week RCT. The intervention included weekly telephonic caregiver RDMI focused on caregiver dietary patterns. Data on RDMI use were collected, including categorization of RDMI Completers versus Non-Completers (compliance), time of RDMI received (minutes, RDMI Time Received), engagement in RDMI (percentage of attempted RDMI sessions completed, RDMI Engagement), and dose (total RDMI sessions, RDMI Dose Received). Caregiver body mass index (BMI), caregiver diet quality (Healthy Eating Index (HEI) scores), youth skin carotenoids (resonance Raman spectroscopy), and caregiver ambivalence toward improving diet quality (Change Questionnaire; higher Change scores indicate lower ambivalence) were collected at baseline and post-intervention. Predictive ability of baseline variables on compliance was evaluated using logistic regression, relationships between RDMI use and ambivalence were evaluated using Spearman correlations, and predictive ability of RDMI use versus program participation on outcomes was determined using multiple linear regressions. Of 36 caregivers, 78% participated in ≥ 1 RDMI session, 44% were RDMI Completers, and PAC BMI was the top predictor of RDMI completion (OR=1.080). For every one-session increase in RDMI Dose Received, a 0.98 point increase in caregiver HEI score and 0.59% increase in child skin carotenoids were noted. Lastly, a strong statistically significant relationship existed between percent change in Change score at post-intervention and RDMI Dose Received ($p=0.533$, $P=0.007$), while baseline Change scores were negatively correlated with RDMI Time Received ($p=-0.287$, $P=0.173$) and RDMI Engagement ($p=-0.260$, $P=0.221$). This study provides preliminary support for the use of RDMI in low-resource caregivers for obesity prevention.

Feasibility and effects of physically active lessons on movement behaviour and executive function of elementary schoolchildren: ERGUER/Aracaju Project

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Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: To verify the feasibility and the effects of physically active lessons (PAL) on movement behaviour and executive function of elementary schoolchildren.

Methods: A controlled clinical trial with cluster sampling was carried out with 61 elementary children from a school in Aracaju/SE, Brazil. Two classes in the intervention group (n = 34) received dynamic activities linked to the pedagogical content conducted by the teachers, during two school years. Control group classes (n = 27) continued with regular traditional classes. Movement behaviours were evaluated through ActivPal and ActiGraph GT3X accelerometers during the school shift. Executive function was assessed using three computerized tests: a) Go / No Go (reaction time/inhibition); b) Visual search (spatial reasoning); and c) Mental rotation (spatial reasoning). The evaluations took place in five moments, two in 2018 (April and August) and three in 2019 (January, July, and December). Models of Generalized Estimation Equations with Bonferroni's post hoc were used for data analysis ($p < 0.05$). The intervention teachers in 2018 (n = 2) and 2019 (n = 2) reported aspects related to the intervention's feasibility through interviews. Content analysis was used for qualitative data.

Results: Intervention group reduced stationary behavior (group vs time interaction: $p = 0.01$) and increased light physical activity (group vs time interaction: $p = 0.044$) at school over the two years of follow-up. Regarding executive function, higher increases in Go / No Go (number of correct answers and time of execution from pre vs. post: $p \leq 0.001$), and the time of execution of the Visual search test (from pre vs. post: $p = 0.040$) were observed in intervention group compared to the control group. While the teachers assessed intervention as feasible, higher number of barriers were reported by the teachers of the second year of intervention, especially concerning to their training to conduct the intervention and the student's behaviors.

Conclusions: PAL are effective in reducing stationary time and increasing time in light physical activity as well as can promote modest improvements in executive functions in children. However, strategies concerning teacher training are necessary, mainly, to maintain long-term results.

Exploring the determinants of dietary supplement use among Canadian university students using the Theory of Planned Behaviour framework

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Special Interest Group: **B. Motivation and behavior change (SIG)**

Purpose: The purpose of this study was to identify the psychosocial determinants of (1) intention to use dietary supplements (DS) and (2) the behavior of engaging in supplementation by testing the fit of the Theory of Planned Behavior (TPB) among university students.

Methods: A total of 778 students at a Canadian university in Ontario completed a cross-sectional survey assessing participants' attitude, injunctive norm, descriptive norm, perceived behavioral control and intention toward DS use. Data were analyzed using independent sample t-tests and linear and logistic regressions. Results/findings: 49.1% of the 778 students (age 17-31) reported using at least one DS in the past 6 months.

Findings indicated significant differences in mean scores for constructs of the TPB between DS users and non-users ($p < 0.001$). Attitude, injunctive norm and perceived behavioral control were significant predictors of intention to use DS. Attitude, injunctive norm and intention were significant predictors of engaging in supplementation. The model explained 75.5% of the variance and correctly classified 89.6% of cases, supporting the usefulness of the framework for exploring determinants of intention to use DS. The odds of using DS doubled with every one-unit increase in intention, making it the strongest predictor of DS use ($B = 2.04$, $p < 0.001$).

Conclusions: To our knowledge, this is the first study to use the TPB to explore supplement use and fills a large gap in the current literature. By confirming the utility of the TPB in predicting supplement habits, this study reveals important information about core beliefs underlying the use of supplements among Canadian university students. Discovering the critical role of social influence relating to supplement use supports the need for the development of educational programming that focuses on trust and community building when promoting safe supplementation practices.

The role of light versus moderate-to-vigorous PA in relation with fitness and physical self-concept in adolescents

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Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: The key role that physical self-concept plays in influencing physical activity (PA) and physical fitness (PF) participation has been uniformly reported in the literature. However, most studies have focused primarily on the role of moderate to vigorous intensity physical activity (MVPA) whilst disregarding the potential beneficial role of lower intensities of physical activity (LPA) i.e., ~90% of waking time is distributed between LPA and sedentary behavior. Furthermore, the mediating role of physical self-concept in the relationship between PF and PA was very seldom a subject matter of investigation. The purpose of this study was to examine the role of physical self-concept in mediating the cross-sectional relationship between PF with PA (MVPA and LPA) in Dutch adolescents (12-15 years, n=138). The results of the indirect relationship between PF and LPA will be presented at the symposium.

Methods: PA was assessed using accelerometry (Actigraph GT3X+; Pensacola, FL) during a regular physical education lesson. Cardiorespiratory fitness (CRF) and muscular strength (MS) were assessed using items of the European Physical Fitness test battery. Physical self-concept (i.e., athletic competence and physical appearance) was assessed using the Competence Experience Scale for Adolescents. The indirect relationship between PF and PA was examined using a bias corrected bootstrapping technique, controlling for age and BMI and tested for potential moderation effects of gender.

Results: Regression analysis revealed no direct relationship between PF indices (CRF and MS) with PA. However, we found a significant indirect effect of both PF indices on MVPA, mediated by perceived athletic competence but not by physical appearance. These indirect effects were moderated by gender: in girls, but not in boys mediation was confirmed

Conclusions: Our study suggests that higher PF levels (CRF especially) might lead to a higher physical self-concept which in turn may promote higher engagement in MVPA. The contrast in results between MVPA and LPA will be presented at the symposium. It is recommended to take physical self-concept into account in future PA interventions, especially in girls. Additional research is warranted to determine the causal pathways of the indirect relationship between PF and PA via physical self-concept.

**O3.37 - Income disparities and eating behaviors across the life course,
June 10, 2021**

Qualitative Exploration of Factors Influencing Food Insecurity Among Low-income Parents of Children 0-5 years in Two High-Income Countries

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Special Interest Group: G. Children and families (SIG)

Purpose: Food insecurity remains a public health concern across the globe and despite access to greater resources, international data has demonstrated that high-income developed countries report an average food insecurity rate ranging from 8-20%. The purpose of this study is to identify potential factors influencing food insecurity and key coping strategies utilized among parents of children aged 0-6 in two high-income countries.

Methods: Semi-structured qualitative interviews were conducted with 40 low-income parents of children aged 0-6 in the United States (U.S.) and Australia (AUS), including pregnant women. Interviews included discussion of family and household dynamics around food procurement and preparation, strategies low-income parents employ to “make ends meet” and provide meals for their families, utilization of government and non-government assistance programs, and needs and recommendations to help support food insecure families. Interviews were audio recorded and transcribed verbatim. Inductive coding using QSR NVivo yielded emergent themes.

Results: Key themes that emerged included: food access and availability (e.g., neighborhood access, transportation, influences on food selection, food pantry use), food utilization (e.g., family food preference, pregnancy specific needs, culturally appropriate foods, kitchen facilities), financial implications (e.g., employment, government assistance time of month impact, competing expenses), resilience and coping (e.g., utilizing resources, budgeting skills, support from families and friends, nutrition knowledge and skill), Coronavirus Impacts (e.g., health, employment, child care), parenting and children (e.g., child awareness of food insecurity, generational poverty), stress and mental health, pregnancy impacts, and recommendations for local efforts to address food insecurity. Across these themes there were differences and similarities between U.S. and AUS interviewees which will be highlighted in the presentation.

Conclusions: A more unified global approach to addressing food insecurity is needed in order to translate best practices and design effective multi-country interventions. Comparing and contrasting the factors that influence food insecurity across the local context in the U.S. and AUS will help researchers better address policy, systems, and environmental components. The findings from this qualitative study can help to inform research on food insecurity across multiple high-income countries.

A nationally representative analysis of trends in socioeconomic inequities in diet quality between 2004 and 2015 among children in Canada

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Special Interest Group: I. Socio-economic inequalities (SIG)

Purpose: Children with a lower socioeconomic position (SEP) tend to have poorer diet quality than their more advantaged counterparts. Evidence indicates that socioeconomic inequities in diet quality are stable or widening among adults, however, few studies have examined trends in the socioeconomic patterning of children's diet quality. Given that SEP and dietary intake are modifiable, a better understanding of trends in socioeconomic inequities in diet quality among children can inform interventions to ensure all children have the same opportunity to attain their full health potential. This study quantified trends in inequities (i.e. absolute and relative gaps and gradients) in diet quality between 2004 and 2015 according to three indicators of SEP among children living in Canada.

Methods: Data from children aged 2-17 years who participated in the cross-sectional, nationally representative Canadian Community Health Survey – Nutrition in 2004 (n=12,800) or 2015 (n=5,800) were analyzed. SEP was classified based on total household income, parental educational attainment and neighborhood deprivation. Dietary intake data from interviewer-administered 24-hour recalls were used to derive Healthy Eating Index-2015 (HEI-2015) scores. Dietary inequities were quantified using four indices: absolute gaps (between highest and lowest SEP), relative gaps, absolute gradients (slope index of inequality) and relative gradients (relative index of inequality). Multivariable linear regression models examined trends in HEI-2015 total and component scores between 2004 and 2015.

Results: Absolute and relative gaps and gradients in total HEI-2015 scores were stable among children between 2004 and 2015 according to all three SEP indicators. There was evidence of widening absolute and relative gaps and of absolute gradients for several HEI-2015 components, including total protein foods, seafood and plant proteins, and sodium. Absolute and relative gaps declined for some components, namely added sugars and saturated fats.

Conclusions: Absolute and relative gaps and gradients in total HEI-2015 scores were stable among children living in Canada between 2004 and 2015. There was some evidence of widening or declining inequities in HEI-2015 components. These analyses are internationally significant, as they are the first to assess absolute and relative gaps and gradients in diet quality among children using nationally representative data.

Correlation Between Mother and Child Diet Quality Differs by Food Security Status

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Special Interest Group: I. Socio-economic inequalities (SIG)

Purpose: This study aimed to characterize diet quality of low-income mothers and their children (8-12yr) and explore differences by food security status. Food insecurity is associated with low diet quality. Evidence suggests parents shield children from food insecurity; thus, we hypothesize that the correlation between diet quality among low-income mothers and children will differ by food security status.

Methods: Forty-six mother and child pairs (n=92) were recruited from a Federally Qualified Health Center to participate in a diabetes prevention program. Thirty-nine pairs completed baseline assessments. Dietary intake was assessed using two 24-hour dietary recall interviews (children) and the Southwest Food Frequency Questionnaire (mothers). Diet quality scores were calculated using the Healthy Eating Index (HEI-2015); higher scores (0-100) indicated better diet quality. Food security was assessed using the 2-item Hunger Vital SignTM; positive responses indicated food insecurity. T-tests were used to determine mean differences in diet quality by food security status. A two-sample test of equality of correlation coefficients determined whether the correlation between mother and child total diet quality differed by food security status.

Results: Mothers were 39.9±6.2 years, 87.2% Hispanic, 53.9% White. Children were 10.3±1.5 years, 46.1% female, 89.7% Hispanic, 56.0% White. Eighteen mother-child pairs were food insecure (46.2%). Mean diet quality score for mothers was 57.6±10.0; scores were lower among food insecure mothers compared to food secure (53.6±8.5 versus 61.0±10.2, p=0.02). Mean diet quality among children was 56.1±13.5 and did not differ by food security status. When stratified by food security status, only food secure mothers and children were significantly correlated (food secure r=0.60, p=0.004, food insecure r=0.13, p=0.60). However, the difference in the mother and child diet quality correlation coefficients by food security status was not statistically significant (p=0.09).

Conclusions: Significant correlations between food secure, but not food insecure, mothers and children were observed. These findings add to the growing evidence suggesting that mothers shield their children from the effects of food insecurity by forgoing their own intake of healthy foods. Future research with appropriately powered studies examining intra- and inter-household differences in food security, food choices and behaviors is needed.

Impulsivity mediates the relationship between food insecurity and disordered eating behaviors among college students

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Special Interest Group: K. Disease prevention and management

Purpose: Food insecurity involves insufficient access to obtaining healthy food, and is highly prevalent among college students. While some emerging research has linked food insecurity to disordered eating behaviors (DEBs), no studies to our knowledge have explored the link between food insecurity and impulsivity as a possible behavioral mechanism explaining the relationship between food security (FS) status and DEBs. This study examined the extent to which impulsivity mediates the relationship between FS status and DEBs.

Methods: A convenience sample (n=423) of full-time undergraduate college students between the ages of 18-25 (78.8% female; 49.4% non-White), completed online surveys about their FS status. Validated measures of FS status (USDA Adult Food Security Survey Module), impulsivity (Kirby Delay Discounting Task), and DEBs (Eating Disorder Examination Questionnaire) were assessed. A multivariate ANCOVA mediation model using the product-of-coefficients examined whether impulsivity level mediated the relationship between FS status (food secure vs food insecure) and DEBs status (present vs. absent), while adjusting for sociodemographic characteristics.

Results: Similar to other US-based estimates, the prevalence of food insecurity among college students in this sample was 27.0%. The prevalence of DEBs being present was 59.1%. Unstandardized beta coefficients derived from the mediation model indicated that impulsivity level significantly mediated ($B=0.01$, $SE=0.006$; 95% $CI=0.001$, 0.02) the relationship between FS status and DEBs status. FS status had a significant direct effect on impulsivity levels ($B=0.03$, $SE=0.01$; 95% $CI=0.003$, 0.06), and impulsivity levels had a significant direct effect on DEBs status ($B=0.35$, $SE=0.16$, 95% $CI=0.04$, 0.67). FS status had a significant direct effect on DEBs status ($B=0.14$, $SE=0.05$, 95% $CI=0.03$, 0.24). Additionally, the direct effect of FS status on DEBs status remained significant after adjusting for impulsivity level ($B=0.13$, $SE=0.05$; 95% $CI=0.02$, 0.23).

Conclusions: In this college student sample, impulsivity is a mediating behavioral mechanism in the relationship between FS status and DEBs status in this college student sample. These findings need to be replicated in other populations. Longitudinal research is needed to examine temporal effects of this relationship to better inform food insecurity interventions.

Does stress-related poor diet quality explain socioeconomic inequities in health? A structural equation mediation analysis of gender-specific pathways

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Special Interest Group: I. Socio-economic inequalities (SIG)

Purpose: Individuals with a lower socioeconomic position (SEP) have poorer health than their more advantaged counterparts. Psychosocial stress and diet quality have been shown to individually mediate associations between SEP and health, however studies have not yet investigated whether psychosocial stress and diet quality jointly mediate these associations. This is an important research question as stress-related unhealthy eating is often invoked as an explanation for health inequities, particularly among women, seemingly with no empirical justification. This study examined whether psychosocial stress and diet quality jointly mediate associations between SEP and self-rated health (SRH) in women and men.

Methods: Adults living in Canada who participated in the 2018 or 2019 International Food Policy Study were included (n=5,645). Participants reported SEP using indicators that reflect materialist (educational attainment, perceived income adequacy) and psychosocial pathways (subjective social status) underlying health inequities. Participants also reported psychosocial stress, dietary intake (to estimate diet quality via the Healthy Eating Index-2015) and SRH. Structural equation modelling simultaneously modelled multiple pathways linking the three indicators of SEP (educational attainment, perceived income adequacy, subjective social status) with SRH mediated by psychosocial stress and diet quality, stratified by gender.

Results: There was no evidence that psychosocial stress and diet quality jointly mediated associations between SEP and SRH in women or men. Diet quality mediated associations between educational attainment and SRH in women and men, and between subjective social status and SRH in men. Psychosocial stress mediated associations between perceived income adequacy and SRH in women and men, and between subjective social status and SRH in women.

Conclusions: Although often invoked as an explanation for health inequities, stress-related poor diet quality did not mediate associations between SEP and SRH in women or men. However, psychosocial stress and diet quality individually mediated some of these associations, indicating that SEP was partially embodied via these pathways, with some differences by gender.

Cost and affordability of healthy, more equitable and sustainable diets in low socioeconomic groups in Australia

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Special Interest Group: I. Socio-economic inequalities (SIG)

Purpose: This study modified and tested the Healthy Diets Australian Standardised Affordability and Pricing (HD-ASAP) protocol, for use with low socioeconomic groups (SEGs) in Australia. The low SEG HD-ASAP aimed to investigate the cost, cost differential and affordability of habitual (based on dietary intake survey data) and recommended (healthy, more sustainable, more equitable) diets for low SEGs. Such evidence has been lacking to support policies and practices to improve food environments and help drive healthier diets in these groups.

Method: Components of the HD-ASAP protocol were modified to align with reported dietary intakes, household incomes, shopping habits and experiences of low SEGs in Australia. Three reference households in the lowest income quintile were used for the modelling. Household A included two adults and two children; Household B included one adult and two children; and Household C included two older, retired adults. To test feasibility and utility of the modified protocol, food pricing data were collected from food outlets in one location. Models using brand name products and generic brands, reflecting a common coping strategy of low SEGs, were tested.

Results: Using brand name products, compared with habitual diets, recommended diets were 17% less expensive for Household A; 10% less expensive for Household B; and 4% less expensive for Household C. When generic brand products were costed, compared with habitual diets, recommended diets were 10% less expensive for Household A; 2% more expensive for Household B; and equal cost for Household C. In two households (A and B), reliance on unemployment benefits, resulted in both habitual and recommended diets being unaffordable (>30% of household income) unless generic brands were purchased.

Conclusions: The low SEG HD-ASAP protocol shows that recommended diets can be a similar cost or more expensive than habitual diets when generic products are chosen, contributing to perceptions that healthy food is unaffordable. This study demonstrates the need for policies to increase the affordability of healthy diets by targeting both prices of healthy food and ensuring adequate household incomes amongst low SEGs specifically.

**O3.38 - Physical activity and diet in disease prevention/management,
June 10, 2021**

Diet-related factors associated with weight loss among young adults: Do men and women differ in eating behaviors and patterns?

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Special Interest Group: K. Disease prevention and management

Purpose: Declines in diet quality are common during young adulthood, which is associated with weight gain and obesity risk. Data indicate young men have poorer diet quality compared to women. These differences could be explained by eating patterns and behaviors, which might also be differentially associated with outcomes in a behavioral weight loss (BWL) program. Objectives were to: 1) examine if young men and women differ in eating behaviors and patterns; and 2) determine whether these behaviors/patterns are associated with weight loss.

Methods: Participants (N=382, 18-25 years, 58% racial/ethnic minority, age=21.9+2.2, BMI=33.5+4.9 kg/m²) were drawn from a technology-based BWL trial targeting young adults. Weight was assessed objectively in-clinic at baseline and 3-months. Participants answered questions related to their eating behaviors (pre-planning, meal preparation, eating away from home, and confidence in cooking; [1=Strongly Disagree, 5=Strongly Agree]) at baseline and 3-months. T-tests were used to examine gender differences in baseline eating behaviors and patterns. GLM examined gender differences in change at 3-months, controlling for treatment arm. Bivariate analysis was used to examine associations between changes in eating-related behaviors and weight change for men and women.

Results: Men had lower baseline scores for meal planning in advance ($p=.004$) and using a grocery list to shop ($p=.000$) compared to women. No gender differences in cooking confidence were observed at entry or 3-months ($p's>.05$). Men reported greater improvement in controlling food in the home ($p=.013$) than women. Higher baseline cooking confidence ($r=0.17$, $p=.002$) and improvements in thoughtful eating ($r=0.30$, $p=.000$) were associated with weight loss at 3-months for both men and women. For men, more cooking at home ($r=-0.47$, $p=.002$) and not having someone else prep meals ($r=0.39$, $p=.015$) was associated with greater weight loss. For women, not eating 4 hours before sleep was associated with greater weight loss ($r=0.16$, $p=.036$).

Conclusions: Findings suggest that cooking confidence and thoughtful eating are associated with weight loss outcomes for both young men and women. However, cooking at home and meal preparation were related to weight loss for men only. Findings can inform intervention targets for BWL programs for young adults.

Associations between health, cooking skills, and processed food extend beyond diet quality: Results from two Canadian Community Health Surveys (CCHS) on food skills

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Special Interest Group: K. Disease prevention and management

Purpose: The study purpose was to explore associations between six health outcomes (general health, mental health, obesity, type 2 diabetes, high blood pressure, and heart disease) and one diet quality indicator (fruit and vegetable intake) with cooking abilities and cooking with processed foods.

Methods: Datasets from two Rapid Response Canadian Community Health Surveys (CCHS) on food skills in 2012 and 2013 were stacked. All minors (<18 years old) were excluded, producing an analytic sample of 19,110 adults. Independent logistic regression models were used to test separate associations between each self-reported health and diet outcome with each independent variable (cooking abilities defined as basic, moderate, and advanced and processed food use defined as minimally-, moderately-, and highly-processed), controlling for age, gender, income, marital status, education, employment status, race, and province of residence.

Results: In fully adjusted models, compared to adults with advanced cooking abilities, those with moderate or basic cooking abilities had significantly lower odds of meeting fruit and vegetable recommendations, reporting very good/excellent mental health, and having obesity (all $p < 0.05$). Compared to adults with advanced cooking abilities, adults with moderate cooking abilities had significantly lower odds of having type 2 diabetes ($p = 0.01$). Compared to adults who used minimally-processed foods, those who used moderately- or highly-processed foods had significantly lower odds of meeting fruit and vegetable recommendations, reporting very good/excellent mental and general health (all $p < 0.05$). Compared to adults who used minimally-processed foods, those who used moderately-processed foods had significantly higher odds of having obesity ($p = 0.01$). There were no significant associations between cooking abilities and general health, high blood pressure, or heart disease or between processed food use and type 2 diabetes, high blood pressure, or heart disease.

Conclusions: This exploratory study revealed strong associations between mental health, cooking skills, and processed food, which should be considered in future research on food skills and diet. Results suggest that having strong cooking skills is not always protective against diet-related diseases (i.e., obesity and type 2 diabetes). Overall, findings reinforce the premise that the value of food skills extends beyond mere diet quality to include broader health outcomes.

Combination Nutrition and Physical Activity Intervention Improves Adherence to Evidence-based Guidelines and Cardiovascular Health in Cancer Survivors

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Special Interest Group: C. Cancer prevention and management (SIG)

Purpose: Evidence-based diet and physical activity guidelines for cancer survivors are designed to reduce toxicity of therapy, improve health outcomes, and promote healthy longevity. The World Cancer Research Fund/American Institute for Cancer Research (WCRF/AICR) Recommendations have recently been operationalized to measure compliance, yet these standardized scoring criteria have not been applied to determine change in survivor adherence after intervention nor assessed for associations with cardiovascular health to inform clinical utility. Therefore, the objectives are to define: 1) change in WCRF/AICR Score pre- to post-intervention and maintenance after a combination nutrition and physical activity intervention; and 2) relationships between WCRF/AICR Score and biomarkers of cardiovascular health.

Methods: Cancer survivors with overweight and obesity (n=62) enrolled in a 6-month biobehavioral intervention designed to promote high compliance to evidence-based WCRF/AICR diet and physical activity recommendations. Intervention components included education and skills development, remote nutritional counseling with motivational interviewing, e-technologies, and produce harvesting. A tapered 6-month maintenance phase followed. Clinical and anthropometric assessments were completed using standard protocols at baseline, post-intervention, and post-maintenance. Dietary intakes are defined by 30-day food frequency questionnaires. Minutes of moderate-vigorous physical activity are measured via FitBit. WCRF/AICR Score is calculated following standardized scoring criteria (range 0-7). Changes in score are determined via a linear model with a correlated error structure within subject and a fixed effect for time. The predictive ability of score on cardiovascular biomarkers is assessed using this same modeling approach with the score as an additional fixed effect.

Results: Enrollment mean WCRF/AICR Score was 3.47 ± 1.09 . Mean score was increased to 4.37 ± 1.25 at post-intervention ($p < 0.001$). Participants increased adherence to all recommendations. Scores remained elevated at post-maintenance (n=55, $p < 0.001$). Total WCRF/AICR Score was a significant predictor of triglycerides ($p = 0.023$), with a one-point increment in recommendation adherence associated with a 5% decrease in triglycerides. Increases in score likewise trended toward decreases in blood pressure, total cholesterol, and LDL cholesterol.

Conclusions: Participation in a WCRF/AICR diet and physical activity intervention results in significant increases in adherence that are associated with improved cardiovascular health. Feasible, effective, and affordable programs targeting survivors are paramount to promoting recommended lifestyle behaviors to mitigate risks.

Exploring Physical Activity Trajectories in a Positive Psychology-Motivational Interviewing Intervention Among Patients with Type 2 Diabetes

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Special Interest Group: K. Disease prevention and management

Purpose: Physical activity is critical for preventing and treating Type 2 diabetes (T2D). The rising prevalence and morbidity of T2D necessitate novel approaches to promote physical activity in this population. This study analyzes longitudinal trajectories of change in moderate-to-vigorous physical activity (MVPA) in a positive psychology (PP) and motivational interviewing (MI) intervention using latent growth curve modeling (LGCM). Analyses identified subpopulations within the larger group of participants who responded similarly to the intervention and examined if sociodemographic, medical and psychosocial covariates were associated with MVPA trajectories.

Methods: The BEHOLD-8 and 16-week randomized controlled trials examined the impact of a PP-MI intervention on MVPA in patients with T2D. Objective measures of MVPA were collected using Actigraph accelerometers at three time-points: pre-intervention, immediately following the interventions, and 8 weeks following interventions. LGCM was conducted using the Stata GLLAMM command, and covariates were considered significant at $p < 0.05$.

Results: Analyses included 47 participants with complete follow-ups: 48.9% male, 80.9% non-Hispanic white, average age 66.1 (SD=10.1). LGCM identified three profiles with distinct MVPA trajectories. Profile 1 ("Started Low, No Change") encompassed 63.8% of participants, with a starting mean of 4.54 minutes of MVPA/day and decreased by -3.36 minutes by the end of follow-up. Profile 2 ("Moderate Start, Minimal Change") included 27.7% of the participants and had a starting mean of 22.86 minutes/day of MVPA with an average increase of 1.03 minutes over time. Profile 3 ("Started Low, Ended High") included 8.5% of participants, had a starting mean of 7.33 minutes MVPA/day, and increased by 28.4 minutes over time. Overall, 36% of the participants increased MVPA while 57% did not. Being male, younger, having fewer comorbidities and less anxiety were significantly associated with MVPA.

Conclusions: This secondary analysis detected three distinct physical activity profiles during and after a PP-MI intervention. Future interventions can target individuals with characteristics that showed the greatest benefit and add additional supports to people in groups that did not increase physical activity as much. These findings show a need for targeted and sustained behavior change strategies during and after physical activity interventions.

The relationship between physical activity and mental health among immigrants from a holistic biopsychosocial/biocultural perspective

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Special Interest Group: K. Disease prevention and management

Purpose: Physical activity (PA) participation has been posited to be associated with positive mental health (MH) and psychological well-being. The suggested MH benefits of PA can be particularly beneficial for immigrants/refugees who encounter various migration stressors that put their MH at risk. Despite the distinctive nature of the PA-MH relationship amongst immigrants, most research in this area focused on a biomedical/kinesiological perspective. Applying a holistic biopsychosocial/biocultural lens, this systematic scoping review aims to examine the relationship between different PA domains and immigrants/refugees' MH in Western countries.

Methods: Five automated databases (PsycINFO, Medline, Embase, PubMed, and Anthropology Plus) were systematically searched, following PRISMA guidelines, to identify pertinent quantitative and qualitative studies from Europe, Canada, the US, Australia and New Zealand. All age/gender groups were eligible, and no restrictions were made on immigrants/refugees' home countries.

Results: Forty-nine studies were included in this review. Leisure PA participation was significantly associated with reduced symptoms of depression, post-traumatic stress disorder, psychological distress and anxiety among immigrants via different mechanisms, including improved self-confidence, mastery experiences and staying energized and minimizing risky behaviors. Participation in leisure ethnic sports (e.g. Taekwondo for Korean immigrants) additionally improved immigrants' MH by enhancing their ethnic identity and mitigating their feelings of loneliness and cultural insecurity. Gender stereotyping and gendered norms in sports limited immigrant women's movement, triggering feelings of inequality and negatively impacting their MH. Participation in travel and domestic PA was associated with low depression and psychological distress symptoms, with reported pathways involving improved mobility, making time pass and feelings of self-accomplishment. Occupational PA performance was associated with conflicting outcomes, with the type of performed occupation being a significant determinant of immigrants' MH. Suboptimal MH was significantly and positively associated with low PA engagement, resulting in a vicious cycle of physical inactivity and MH challenges.

Conclusions: Longitudinal and mixed-method studies that utilize holistic biopsychosocial/biocultural frameworks are required to thoroughly understand the links between PA and immigrants' MH. This will help direct tailored, evidence-based PA interventions and policies that foster PA participation and positive MH outcomes amongst immigrants.

Cross-lagged associations between patterns of objectively-measured sedentary time and emotional disorder symptoms across early adolescence

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Special Interest Group: K. Disease prevention and management

Purpose: Evidence suggests that the manner in which sedentary time is accumulated throughout the day is important for physical health. It remains unknown if the way in which sedentary time is accumulated also relates to emotional health, which is especially important to understand during the transition from childhood to adolescence. We explored the longitudinal and bi-directional associations between sedentary time accumulation metrics (i.e., bout length, bout length distribution, and breaks) and symptoms of major depressive disorder (MDD) and generalized anxiety disorder (GAD) during the adolescent transition among Los Angeles youth.

Methods: Youth (N=167, 10.1[0.9] years old at baseline, 54.5% female, 59.3% Hispanic, 35.9% overweight/obese at baseline) participated in a 3-year longitudinal study that consisted of 6 assessments of sedentary time, and symptoms of MDD and GAD at 6-month intervals. At each assessment, participants wore waist-worn accelerometers (Actigraph GT3X) for 7 days and completed the Revised Child Anxiety and Depression Scale. Those who had ≥ 1 days of accelerometer data for ≥ 2 assessments and self-reported emotional disorder symptom data were included. Separate random intercept cross-lagged panel models (RI-CLPM) estimated the within-person uni-directional and bi-directional associations between the sedentary time accumulation metric variables, and symptoms of MDD and GAD across all temporally adjacent assessments (i.e., assessment 1 to assessment 2, assessment 2 to assessment 3, etc.).

Results/Findings: The RI-CLPMs did not reveal bi-directional associations between any of the study variables. However, within-person uni-directional associations were observed across some assessments. Within-person variation in MDD and GAD symptoms most-consistently predicted sedentary time accumulation. Typically, higher-than-usual MDD or GAD symptoms were associated with longer, less evenly distributed sedentary bouts, and fewer breaks than usual 6 months later, independent of average levels of MDD or GAD symptoms.

Conclusions: Deviations from one's usual level of depressive or anxiety symptoms, even at subclinical levels, may contribute to the allocation and distribution of sedentary time accumulation 6 months later, but not vice versa. Future studies should attempt to replicate findings and establish causality, as just-in-time adaptive intervention strategies targeting occasions when depressive or anxiety symptoms are higher-than-usual may promote a healthier accumulation of sedentary time among youth.

**O3.39 - Trends in purchases of sugar-sweetened beverages, plant-based protein and fruit and vegetables,
June 10, 2021**

Recent trends in observed customer purchases of sweetened beverages at US convenience and other small food stores

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Special Interest Group: H. Policies and environments (SIG)

Purpose: Cardiovascular health is linked to sugar- and artificially-sweetened beverages (SSBs and ASBs). Previous US studies document declines in SSB purchases, but it is unclear if similar trends exist in convenience and other small stores where SSB and ASB purchasing is common and point-of-sales data are difficult for researchers to obtain. We examined trends (2014-2017) in observed SSB and ASB purchases at convenience and other small food stores as well as differences in purchasing by customer characteristics.

Methods: We used observational food and beverage purchase data collected annually (2014-2017) from 3039 customers at 147 randomly-sampled stores in Minneapolis/St. Paul, USA. Customers ≥ 18 years who made a food/beverage purchase were recruited. SSB sub-types included any ready-to-drink sweetened soda, fruit, sport, energy, tea, or other drink, and ASBs included artificially-sweetened versions. Mixed regression models examined purchase trends over time and associations with customer characteristics, accounting for customers nested within stores and stores repeated over time.

Results: Nearly 50% of customers purchased SSBs with 25% of all customers purchasing soda. There was no evidence of change over time in the proportion of customers purchasing SSBs overall or across beverage sub-types. A similar pattern was observed for ASBs, though $<10\%$ of customers purchased ASBs. SSB purchasing was highest among men, those 18-39 years, customers with lower educational attainment and income, and customers that shopped daily (vs. less frequently) at the store. SSB purchasing overall did not vary by race/ethnicity, but did by sub-type (e.g., non-Hispanic White had higher purchasing of energy drinks and lower purchasing of fruit and soda drinks than non-Hispanic Black). ASB purchasing was highest among women, those 40-59 years, non-Hispanic White, Hispanic, and customers with higher educational attainment and income.

Conclusions: Despite research indicating promising trends in reduced SSB consumption and purchasing in the US, we identified a flat trend over time (2014-2017) at convenience and other small food stores with nearly half of customers continuing to purchase SSBs. SSBs and ASBs are growing targets for public policy and health campaigns. Results demonstrate additional work is needed curb sweetened beverage purchasing at convenience and other small food stores.

Sugar-sweetened beverage purchases in urban Peru before the implementation of tax and warning label policies: A baseline study

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Special Interest Group: H. Policies and environments (SIG)

Purpose: This study aims to estimate the probability and volume of sugar-sweetened beverage (SSB) purchases among urban households in Peru in 2016-2017, prior to the SSB tax implemented in 2018. The 2018 regulation increased the tax on high-sugar (>6 g/100 mL) beverages containing added sugar, sweeteners, or flavors from 17% to 25%, while the tax on lower sugar beverages remained at 17%. Additionally, we examine differences in purchases by socioeconomic status (SES) to understand which groups are most likely to be impacted by the tax and 2019 front-of-package warning label law.

Methods: The dataset includes monthly household purchase data from 5145 households (91,599 household-month observations), collected by Kantar WorldPanel Peru from January 2016 to December 2017. We used logistic regression to estimate the probability of purchase in a month by beverage type and tax status (under the 2018 regulation), overall and by SES. SES was determined based on an assets index and key sociodemographic characteristics and ranged from high (A/B) to low (E). Using two-part models, we estimated volume purchases of each beverage type overall and by SES among purchasers, with robust standard errors. Models included fixed effects for month, year, and region, and adjusted for head of household education, household size, and number of children (≤12 years).

Results: The predicted probability of purchasing any taxed high-sugar (>6 g/100 mL) beverage in a month was 92.1% (95% CI: 91.7, 92.5). An estimated 85.7% (85.1, 86.3) of households purchased regular soda, the most commonly purchased beverage type, with no significant differences by SES. Regular soda purchases also comprised the largest quantity of any beverage type by volume for all groups, except the high SES group, which purchased more water. Estimated volume purchases of regular soda were highest in the high SES group [2517 (95% CI: 2367, 2666) mL/capita/household/month] and lowest in the low SES group [1905 (95% CI: 1785, 2026) mL/capita/household/month].

Conclusions: SSB purchases, particularly sodas, are ubiquitous across all levels of SES in urban Peru, although high SES households purchase the largest volume. Impact evaluations of recent tax and warning label policies should consider potential differential effects by SES.

Trends in purchases of plant-based proteins in US households from 2015-2018: An analysis of Nielsen Homescan Consumer Panel Data

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Special Interest Group: H. Policies and environments (SIG)

Purpose: In response to concerns about the health and environmental effects of animal-based food consumption, the market for plant-based proteins has grown substantially in recent years. Households that purchase these products have not been well-characterized. We used nationally-representative data to describe sociodemographic characteristics associated with plant-based protein purchases.

Methods: Data were from 91,445 US households in the Nielsen Homescan Consumer Survey, 2015-2018. Volume of plant-based protein purchases (tofu, tempeh, seitan, and meat analogues) was used to classify households as purchasers or non-purchasers. Multivariate generalized linear models with year fixed-effects were used to model likelihood of plant-based protein purchase over time and associations with household income, education, and race/ethnicity. Two-part models were used to assess continuous per-capita purchase volume over the same time period and associations with the same sociodemographic characteristics. All analyses accounted for complex survey design.

Results: From 2015-2018, an estimated 13.0% (95% CI: 12.7-13.2%) of households purchased plant-based protein within a given year, with a mean volume of 145.1 (95%CI: 137.3-152.9) grams/capita/year. There was no change in estimated prevalence or volume of plant-based protein purchases from 2015-2018. Non-Hispanic Asians had a higher likelihood of purchasing plant-based proteins than any other racial/ethnic group [30.5% (28.6-32.4%), all $p < 0.001$], and purchased an estimated 360.5 (314.5-406.4) grams/capita/year (all $p < 0.001$). There were no significant differences in likelihood or volume of plant-based protein purchases between Non-Hispanic white, Non-Hispanic Black, and Hispanic-identifying households. Low-income households were more likely to purchase plant-based proteins [15.4% (14.9-16.0%)] than middle- [12.8% (12.4-13.1%), $p < 0.001$] and high-income households [11.1% (10.7-11.6%), $p < 0.001$]. Low-income households also purchased greater volume of plant-based proteins than those with higher income [200.4 (181.4-219.5) grams/capita/year for low-income households vs. 138.2 (129.2-147.2) for middle- and 110.1 (100.4-119.8) for high-income households, all $p < 0.001$]. There were no consistent associations between education and plant-based protein purchases.

Conclusions: A small proportion of US households purchased plant-based proteins and, surprisingly, this did not increase between 2015 and 2018 in a large, national sample. Low-income households were more likely to purchase plant-based proteins, suggesting a need to target policies and marketing strategies to high-income groups to increase uptake of sustainable protein alternatives.

Trends in the adolescent consumption of sugary soft drinks and related socioeconomic differences across 14 Eastern European countries between 2002 and 2018

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Special Interest Group: G. Children and families (SIG)

Purpose: High intake of sugary soft drinks (SSDs or sodas) contributes to detrimental cardio-metabolic indicators in youth. Monitoring SSD consumption is informative for risk assessment but lacking in Eastern Europe. This study aims to describe time trends in the national prevalence of daily consumption of SSDs and related socioeconomic differences among Eastern European adolescents between 2002 and 2018.

Methods: We used 2002, 2006, 2010, 2014 and 2018 data of the 'Health Behaviour in School-aged Children' school-based study. Nationally representative samples of adolescents aged 11, 13 and 15 years were included (n=325,184 from 14 countries; 51.2% girls). Adolescents completed a standardized questionnaire in class, including a short, validated food frequency questionnaire. We categorised adolescents into three socioeconomic groups based on the relative family affluence scale (FAS, 20% lowest, 60% middle and 20% highest). Adjusted prevalence of daily SSD consumption by survey year and time trends between 2002 and 2018 were computed at the country level using multilevel logistic models (overall and stratified by FAS groups; clusters were schools).

Results: In 2018, the prevalence of adolescents consuming SSDs everyday varied considerably between countries [range, 5.1%-28.1%], with prevalence higher than 20% in 5/14 countries. Between 2002 and 2018, the prevalence of daily SSD consumption declined in 10/14 countries (P for linear trends ≤ 0.004). The largest reductions were observed in Slovenia (OR 0.48, 95%CI: 0.45-0.50) and the Russian Federation (OR 0.67, 95%CI: 0.64-0.70). Daily SSD consumption reduced at faster rates among the most affluent adolescents (who were more frequent consumers 2002 however) than in the least affluent adolescents in 11/14 countries (P ≤ 0.004). Thus, differences between FAS groups narrowed over time, or even reversed. In 2018, larger proportions of daily consumers were found among the least affluent adolescents in 2018 in 5/14 countries (P ≤ 0.05). Social patterning was similar among boys and girls, and in all three age categories.

Conclusions: Daily adolescent consumption of SSDs decreased between 2002 and 2018 in most Eastern European countries, mainly driven by larger declines among more affluent adolescents. These results are useful to evaluate and plan interventions promoting healthy childhood diets.

Differences in Fruit and Vegetable Purchases by Urban/Rural Status and SNAP Participation Among U.S. Households

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Special Interest Group: H. Policies and environments (SIG)

Purpose: U.S. urban and rural communities face different challenges in accessing healthy food. Previous studies have examined differences in fruit and vegetable availability between urban and rural communities, but few have examined how the intersection of urban/rural status and Supplemental Nutrition Assistance Program (SNAP) participation affects food purchasing at the household level. This study aimed to address this gap by assessing fruit and vegetable purchasing at the intersection of SNAP participation status and urban/rural status among a nationally representative sample of U.S. households.

Methods: Cross-sectional data from the USDA's National Household Food Acquisition and Purchase Survey was used to assess fruit and vegetable purchasing among 1,149 rural households (32.44%) and 3,001 urban households (67.56%). SNAP participation status was categorized as follows: SNAP household, eligible non-SNAP household, and ineligible non-SNAP household. Stratified linear regression models were used to identify significant associations between SNAP status and total amount of money (\$US) spent on fruits and vegetables by urban/rural status. All models were controlled for covariates such as race/ethnicity, education level, and car access.

Results: Rural household heads were more likely to be older, female, non-Hispanic White, and have lower educational attainment compared to urban household heads. SNAP households, regardless of urban/rural status, spent less money on fresh and frozen fruit and vegetables compared to ineligible non-SNAP households. For urban households, SNAP households spent more money on shelf-stable fruit and vegetables than ineligible non-SNAP households. For rural households, SNAP households spent less on shelf-stable fruits and vegetables than ineligible non-SNAP households. Further, among rural households, SNAP households and eligible non-SNAP households spent significantly less money on fruits ($p < 0.0001$ & $p = 0.0003$, respectively) and vegetables ($p < 0.0001$ & $p = 0.03$, respectively) compared to ineligible non-SNAP households. Among urban households, only SNAP households spent significantly less money on fruit ($p < 0.0001$) and vegetables ($p < 0.0001$) compared to ineligible non-SNAP households.

Conclusions: Associations between SNAP status and fruit and vegetable purchasing differed by urban/rural status, with low-income rural households purchasing less fruits and vegetables. Future studies should examine how these disparities influence risk for poor diet quality and chronic disease.

Adherence to food-based dietary guidelines: a systematic review of high-income and low-and middle-income countries

Dr. Ana Carolina Leme^{1,2}, Miss Sophia Hou¹, Associate Professor Regina Mara Fisberg³, Associate Professor Mauro Fisberg², Associate Professor Jess Haines¹

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Special Interest Group: H. Policies and environments (SIG)

Purpose: To report on the adherence to national food-based dietary guidelines (FBDGs) in high-income (HIC) and low-and-middle-income countries (LMIC).

Methods: The protocol for this systematic review was registered with PROSPERO and has been reported according to PRISMA guidelines. Systematic review with searches in six databases was performed up to June 2020. Peer-reviewed, English language articles were included if they investigated a population of healthy children and adults (7-65 years), used an observational or experimental study design evaluating adherence to own country FBDGs. Two reviewers independently extracted data and assessed their quality using a designed appraised tool developed by Effective Public Health Practice Project (EPHPP).

Results: Almost 40% of the population in both HIC and LMIC had diets that did not adhere to their national FBDGs. Fruit and vegetables (FV) were the most reported and the prevalence of meeting FV guidelines was between 7% to 67.3%. Discretionary foods were reported by 11 (22.4%) studies. HIC have a higher consumption of discretionary foods, while results were mixed for LMIC. Grains and dairy were consumed below the recommendations in both HIC and LMIC. Consumption of animal proteins, particularly red meat in LMIC and Spain, exceeded the recommendations.

Conclusions: Dietary guidelines are useful tools to promote a healthy diet for different age groups. Individuals from HIC and LMIC may be falling short of at least one dietary recommendation from their country's guidelines. A number of socio-demographic factors may influence guideline adherence. Future health policies, behavioral-change strategies, and dietary guidelines may consider these results in their development.

S3.23 - Physical activity for health in Africa during COVID-19 and beyond: Translating evidence into action through the co-development of a series of regionalised policy briefs, June 10, 2021

Chair: Estelle Lambert, Professor and Director, University of Cape Town

Discussant: Pamela Wadende, Lecturer, Kisii University Kenya

Purpose: The purpose of this symposium will be to share the experience of how the COVID-19 pandemic mobilised academics and implementation partners in the African region to develop a series of evidence-based policy briefs to provide guidance on physical activity (PA) for health in Africa.

Rationale: The COVID-19 pandemic has exacerbated many health equity issues and quarantine restrictions in some countries have led to a decrease in PA and increased sedentary behaviour. Indirectly however, COVID-19 has presented a "critical moment" for governments to recognise that access to safe and enjoyable PA is a basic human right. The response of civil society to "lockdowns", closure and phased re-opening of schools and gyms, and careful resumption of sport, has highlighted the urgency of this call to policy- and decision-makers at local and national levels. Only 4 countries in the African region have national PA plans, so for many countries, COVID-19 is the first time that governments have had any regulations concerning PA.

Objectives: Our overarching aim is to document the process of developing a series of regionally-contextualised, evidence-based policy briefs providing guidance on PA in Africa, during COVID-19 and beyond. Summary: We will present initial and interactive engagement with the South African national government, offering guidance for PA during the phased "lock down", subsequent mobilisation of over 40 academics and implementation partners across the African region, representing 9 countries, to contribute to a consultative and iterative process of developing an initial policy brief for the general public, then for children, persons living with disabilities and school sport. Importantly, we will present the structured and ongoing dissemination and impact evaluation.

Format: The session will be structured as follows: Lambert EV (University of Cape Town) Introduction (9min) Physical activity for health in Africa during COVID-19 and beyond: from phased lockdown to policy guidance when "opportunity knocks" Kolbe-Alexander T (University of Cape Town) (12min) Developing a Regionally- Contextualised, Evidence-based Policy Brief on Physical activity for Health in Africa during COVID-19 and Beyond Naidoo R (University of KwaZulu-Natal) (12min) Physical activity and health in Africa for children and adolescents with or without disabilities: COVID-19 and beyond-FOR HOMES, SCHOOLS AND COMMUNITIES Christie C (Rhodes University) (12min) Co-creating a policy brief for organized school sport in Africa for children and adolescents: COVID-19 and beyond Interaction: The discussant (Wadende P, Kisii University, Kenya) will summarise the session and lead an interactive dialogue with participants (10-15min).

Physical activity for health in Africa during COVID-19 and beyond: from phased lockdown to regionalised physical activity policy guidance when “opportunity knocks”

Associate Prof. Tracy Kolbe-Alexander^{1,2}, Prof. Estelle Lambert¹, Prof. Georgia Torres³, Prof. Paola Wood⁴, Prof. Philippe Gradidge³, Dr. Fredrick Mashili⁵, Associate Prof. Lisa Micklesfield⁶, Ms. Clare Bartels⁷, Dr. Frederick Marais⁸, Ms. Kathleen McQuaide⁸, Dr. Muthoni Gichu⁹, Prof Rowena Naidoo¹⁰, Associate Professor Candice Christie¹¹, Dr. Adewale Oyeyemi¹², Dr. Jacolene Kroff¹, Dr. Feyisayo Odunitan-Wayas¹, Dr. Kufre Okop¹, Prof. Christa Janse van Rensburg¹³

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Special Interest Group: H. Policies and environments (SIG)

Purpose: Our overarching aim was to document the process of developing a regionally-contextualised, evidence-based policy brief providing guidance on PA in Africa, during COVID-19 and beyond.

Development: An invitation to contribute to the policy brief was extended to the African PA Network (AFPAN), the Global Diet and Activity Research (GDAR) Network and other experts on PA in the region (N>70). Between April-May 2020, a core writing group was established, the first virtual meeting was held and content was outlined. The structure of the brief was based on the IDRC (<https://www.idrc.ca/en/how-write-policy-brief>) policy brief toolkit.

The literature search comprised published and pre-print evidence previously presented to the South African government, an evolving global database on PA lockdown policies (<http://isca-web.org/english/>) and hand-searching by the writing group (N=18). The document underwent extensive editing, was approved by the wider advisory group (N=43), visually tailored and copy-edited for readability and contextual-relevance for Africa. Dissemination and evaluation was agreed upon, to ensure a cohesive message when engaging governments and other stakeholders. Members were asked to register dissemination plans and responses via an online database.

Results: The brief comprised an executive summary, background on existing evidence for PA and risk mitigation, emphasizing equity, and incorporated the M.O.V.I.N.G. policy framework (<https://www.wcrf.org/int/policy/policy-databases/moving-framework>) for actions within three domains: Active Societies, Environments and People. Successful scaled-up examples from LMICs were provided for each.

Final recommendations included: i) develop a national plan for PA for health and development, ii) train a cadre of health professionals, educators, coaches & community members to promote PA for health, iii) ensure safe & enjoyable opportunities for PA, through urban planning, provision of parks (public spaces) and low-cost programmes close to where people live; iv) adopt a “whole of government” approach, embedding PA in multiple sectors, devising agile and cost-effective solutions. Dissemination and evaluation are ongoing, following an initial webinar launch in Sept 2020 (#PhysicalActivity4Africa received 49 retweets, 78 likes). The web documents have been disseminated to the WHO, various professional societies, provincial and national government ministries and non-government partners, university and other media outlets and evaluation is ongoing.

Conclusions: We collaborated across the African region, developing a contextually-relevant policy brief to guide the promotion of PA during COVID-19 and beyond. Reach and impact evaluation will determine the success of this initiative.

Physical activity and health in Africa for children and adolescents with or without disabilities: COVID-19 and beyond-FOR HOMES, SCHOOLS AND COMMUNITIES

Prof Rowena Naidoo¹, Prof. Verusia Chetty¹, Associate Professor Catherine Draper², Dr. Pamela Wadende³, Prof. Jill Hanass-Hancock⁴, Prof Dané Coetzee⁵, Prof. Peter Bukhala⁶, Prof. Brett Smith⁸, Dr. Marie Young¹⁰, Mr. Nevar Sissing⁹, Dr. Jacques Lloyd¹¹, Mr. Makhaya Malema¹⁰, Prof. Soraya Maart⁷, Prof. Philippe Gradidge², Mr. Moses Isiagi⁷, Dr. Caylee Cook², Dr. Olufunke Alaba⁷, Prof. Estelle Lambert⁷

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Special Interest Group: H. Policies and environments (SIG)

Introduction: COVID-19 has resulted measures restricting active social interactions such as closure of gyms, parks, open leisure spaces, and schools, resulting in increased sedentary behavior among children and adolescents in some countries. The WHO, along with international PA experts, has emphasized the need for children to remain physically active during this pandemic, for physical and mental well-being. While there is a rapidly evolving evidence-base and guidance documents as to how to promote physical activity (PA), at home and school, they are not contextualized for LMIC settings, with informal and often overcrowded urban spaces, and under-resourced schools.

Purpose: We will describe the development of two policy briefs, specifically for PA and health in Africa; the first targeting children and adolescents; the second, for children and adolescents with disabilities. These policy briefs will serve as tools to guide regional and local decision-makers on implementation of policies and practices that promote PA, while creating healthy, safe and accessible environments in schools for children and educators, and within communities for children and caregivers.

Development and dissemination: The development of these policy briefs occurred in parallel with the development of the first policy brief for PA and health in Africa during COVID-19 and beyond. However, this process was initiated in response to a specific request from a provincial government for guidance on PA for children during COVID-19, as schools were considering re-opening in South Africa. An invitation was extended to the original advisory group of PA experts and implementation partners in the region, as well as persons with expertise outside of this initial cohort. A core writing group (N=10) subsequently drafted the policy brief, using an evidence-based approach, incorporating the most recent literature pertaining to COVID-19 and children, community transmission and risk mitigation. The format was based on a template provided by the IDRC. Thereafter, the document was extensively edited and reviewed, reaching consensus with the larger advisory group. The second policy brief followed a similar process, with the primary difference being its co-creation with disability groups from non-government and government sectors. Both policy briefs were visually

tailored and copy-edited to be contextually relevant to Africa. Infographics were developed with key messages suitable for the intended audience and environment. Dissemination and evaluation are ongoing.

Co-creating a policy brief for organized school sport in Africa for children and adolescents: COVID-19 and beyond.

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Special Interest Group: H. Policies and environments (SIG)

Background: With COVID-19 lockdown restrictions there were limited opportunities to be physically active. As lockdown restrictions eased, participation in physical activity was easier. However, while there was some guidance on elite sport, there were no guidelines for return to sport for school going children. There was a push from many stakeholders to come up with appropriate guidelines to guide return to sport within a school setting.

Purpose: Therefore, the purpose of this policy brief was to provide guidance on return to organized school sport during COVID-19 and beyond.

Assimilation, development of the brief and dissemination: Over 40 experts, mostly academics, were included. A core writing group comprising 10 individuals from 6 different institutions and departments from South Africa and Kenya drafted the policy taking an evidence-based approach from scientific literature. Literature pertaining to COVID-19 and participation in sport were sought and the document was compiled with consideration given to the preceding two policy briefs. It needed to be written with scientific evidence but in a style that would be accessible to many different stakeholders including government, schools, pupils and parents. It took into consideration the benefits of sport as a driver of physical activity and identified how to mitigate the risks of spreading the virus taking into consideration different phases of the pandemic, age of the scholars and the type of sport. Working with a production team, the readability and aesthetics of the brief were considered considering our target audience. Images of pupils playing sport in different contexts were included as well as infographics to ensure that those reading the brief could clearly extrapolate the appropriate information needed to proceed with a safe return to sport programme. Dissemination was done using the larger consortium and their networks and social media. This presentation will focus on this process, the outcome as well as lessons learned in all phases of the development of this brief.

S3.24 - Leveraging implementation science to advance health equity in nutrition and physical activity research, June 10, 2021

Chair/Discussant: Taren Swindle, Assistant Professor, UAMS

Purpose: This session will illustrate how implementation science can advance equity in nutrition and physical activity research and practice.

Rationale: There is frequently a gap between research evidence and its use among settings and individuals it is designed to benefit. The gap between research and practice is often larger for settings serving minoritized racial and ethnic groups, rural populations, and populations with lower socioeconomic status. This gap contributes to higher disease burden, poorer health behaviors, and worse health outcomes among these groups (i.e., health disparities).

Objectives:

1. To describe research and practice tools for conducting health equity and implementation research.
2. To discuss key elements of research at the intersection of health equity and implementation science.
3. To illustrate examples of implementation research aimed at improving uptake of nutrition and physical activity practices in schools serving populations that experience disparities in health outcomes.
4. To evaluate existing studies that combine a health equity and implementation science approach to advance uptake of research evidence in the areas of nutrition and physical activity.

Summary: The first session will begin with an overview of opportunities and tools for conducting research in healthy equity and implementation science from the perspective of the National Cancer Institute of the U.S.-based National Institutes of Health. This presentation will provide practical guidance on the use of implementation science models, frameworks, and measures for conducting research in health equity. Next, two research studies will be highlighted that illustrate the application of implementation science methods and frameworks in groups where health disparities are evident. The first study leverages the Consolidated Framework for Implementation Research and the Getting to Equity for Obesity Prevention framework to identify determinants of the implementation of school wellness practices in 51 schools with limited resources serving students of color and students from lower socioeconomic backgrounds. The second study demonstrates the use of the FRAME approach to capturing adaptations made during implementation of a physical activity program among 49 schools serving students from lower socioeconomic backgrounds. Finally, the discussion will provide a brief overview of existing research at the intersection of health equity, implementation science, and nutrition and physical activity and suggest areas for further advancement based on the presentations.

Format: Three 15-minute presentations followed by a 15-minute general discussion

Interaction: The Implementation and Scalability SIG will promote the symposia and facilitate both advance and live questions from the audience.

Opportunities for Advancing Health Equity through Implementation Science

Dr. April Oh

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Special Interest Group: E. Implementation and scalability (SIG)

Purpose: Implementation science bridges the gap between research and practice to improve individual and population health. This presentation will highlight opportunities for the research, practice and policy communities to develop and apply the implementation science knowledge base to improve the equitable impact of moving our physical activity and nutrition evidence base into practice.

Methods and Results: First, NCI funding opportunities, research and practice tools for public use, and training opportunities for conducting health equity and implementation science research will be shared. Second, a discussion on key elements for consideration for health equity in implementation science research projects will be discussed including a focus on social determinants of health, highlighting application of models, frameworks and measures and methodological considerations that address equity in power and knowledge translation and dissemination. Opportunities for engagement and participation in the NCI Implementation Science Consortium in Cancer will be shared, including workgroup opportunities and “public goods” to advance the field.

Conclusions: In nutrition and physical activity, implementation science offers a tool to advance health equity by optimizing care delivery strategies, equalize power in the research process through partnership with stakeholders and communities and by building and co-generating capacity in clinical and community settings, as well as monitor and evaluate equitable implementation to reduce health disparities. As a field, we can start to move as a field to eliminate disparities in physical activity and nutrition outcomes and foster rapid integration of research, practice, policy and equitable implementation.

Adapting to Schools' Needs: Modifications Made During the Delivery of the Physical Activity 4 Everyone (PA4E1) Programme Targeting Disadvantaged Secondary Schools

Mr. Matthew Mclaughlin^{1,2,3,4}, Dr. Rachel Sutherland^{1,2,3,4}, Dr. Elizabeth Campbell^{1,2,3,4}, Mr. Tom McKenzie^{1,2,3,4}, Ms. Lynda Davies^{1,2,3,4}, Dr. Nicole Nathan^{1,2,3,4}, Prof. John Wiggers^{1,2,3,4}, Prof. Luke Wolfenden^{1,2,3,4}

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Special Interest Group: E. Implementation and scalability (SIG)

Purpose: Schools located in lower socioeconomic areas face unique challenges to implementing school physical activity programmes due to their environmental context, resource demands and competing priorities. Modifications during the implementation of school physical activity programmes targeting disadvantaged secondary schools may be essential to maximize their flexibility and effectiveness, reducing the inequities of a 'one-size fits all' approach. Despite their potential to help explain the effectiveness of programmes, an understanding of the type and nature of modifications is seldom documented. The aim was to describe modifications made during the delivery of Physical Activity 4 Everyone (PA4E1).

Methods: The PA4E1 implementation trial, was a two-year randomized controlled trial involving 49 secondary schools from low socio-economic areas of NSW, Australia. Modifications were captured in real-time (during implementation) through regular 30-minute meetings (n=16) of the implementation team. Modifications were initially coded according to Stirman et al's (2013) framework for modifications, through consensus of the implementation team. Subsequently, Stirman et al's 2019 expanded framework FRAME was used to create additional codes. An additional code of 'proposed impact on effectiveness' was also created.

Results: All modifications were fidelity-consistent (i.e. core elements of the intervention preserved) (n=20; 100%). Most modifications (n=16; 80%) were proposed to have a positive impact on the effectiveness of the programme. Three-quarters of modifications (n=15; 75%) applied to all schools in the intervention group, the remaining modifications had impacts at the cohort level (a subset of schools sharing a particular characteristic). The main reason modifications were possible was "available resources (funds, staffing, resources, space)" of the programme deliverers (n=14; 70%). Over half of the modifications were adaptations (i.e. proactive) (n=12; 60%), with the remaining modifications made reactively. Modifications were made to all seven implementation support strategies and to four of seven physical activity practices (the evidence-based intervention). One adaptation was made to the evaluation of the programme.

Conclusions: All modifications were fidelity-consistent and most were suggested to have a positive impact on the intervention. Most modifications were made possible through 'available' implementation team staffing and funding, and

future programmes targeting disadvantaged schools may consider budgeting for modifications and tailoring of the implementation support.

Moving toward equity: considering determinants of implementation of practices to support student wellness in under-resourced schools

Dr. Hannah Lane¹, Dr. Erin Hager², **Dr. Lindsey Turner**³

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Special Interest Group: E. Implementation and scalability (SIG)

Purpose: Myriad evidence-based practices (e.g., wellness practices) promote healthy eating and physical activity in K-12 schools. However, such practices are less likely to be implemented in schools with limited resources, which often serve children of color and/or children living in low-income households. Frameworks such as the Consolidated Framework for Implementation Research (CFIR) identify determinants of implementation in order to develop tailored implementation strategies, but do not explicitly capture upstream, systemic factors (e.g., historical disinvestment, property-tax-based funding) that disproportionately influence wellness practice implementation in under-resourced schools. This presentation draws upon two studies to identify questions/concepts related to these systemic factors that, if integrated into CFIR, could enable implementation strategies that prioritize equity.

Methods: Semi-structured interviews were conducted with K-12 school staff in two studies: (1) an intervention trial to improve implementation of wellness practices in low/middle-income schools; (2) a national mixed-methods study of wellness practices in rural and urban schools. In both studies, interview guides used CFIR. First cycle coding along the five CFIR domains (inner setting, outer setting, characteristics of individuals, wellness practice characteristics, implementation process) was followed by a second coding cycle, which applied the Getting to Equity for Obesity Prevention framework (Kumanyika, 2019) to identify equity-focused questions within each CFIR domain specific to wellness practices.

Results: Across studies, 62 interviews were conducted with administrators, teachers, and other staff. Emerging equity-focused questions included: Do leaders belong to social groups with different perspectives on the need for wellness practices than staff/students (Inner Setting); What roles do under-resourced schools play in their community that may influence implementation, and could these roles be leveraged (Outer Setting); Which resources (e.g., space, staff) matter for which wellness practices (e.g., classroom-physical activity, water access) (Intervention Characteristics); Should implementation strategies focus on task shifting for existing staff, or address obstacles to hiring specialists (e.g., nurses, physical educators) (Process).

Conclusions: This analysis explores the integration of equity-focused research questions within determinant frameworks. To reduce implementation inequities for wellness-promoting practices in under-resourced schools, it is important to engage school stakeholders to define unique organizational characteristics, and develop strategies to address challenges and leverage assets.

S3.25 - Promoting inclusive nutrition and physical activity research: Supporting the health behaviors of neuroatypical children and their families, June 10, 2021

Chair: Holly Harris, Postdoctoral Research Fellow, Erasmus MMedical Center

Discussant: Linda Bandini, University of Massachusetts Medical School

Purpose: Children with neurodevelopmental disorders (NDDs) have an elevated risk of adverse health outcomes such as obesity, anxiety and depression. Although neurodiversity exists on a continuum in the pediatric population, research in behavioral nutrition and physical activity research in children with NDDs is limited. This symposium is an international collaboration of multi-disciplinary researchers and clinicians aiming to initiate a discussion of how we can best support the health behaviors of neuroatypical children.

Rationale: NDDs are complex – yet common – conditions. Characterized by deficits in cognitive or motor function, communication skills, and self-regulatory behaviors, NDDs affect approximately 8.4% of children globally. Children with NDDs often have various physical or intellectual disabilities which present unique challenges to maintaining health behaviors. However, optimizing children’s nutrition and physical activity is critical to reduce their risk of further complications or comorbidities and, in some cases, may contribute to symptom management. While there is no ‘one-size-fits-all’ approach to promoting healthy lifestyle behaviors in children with NDDs, there is an urgent need to consider a) adapting interventions that are currently available to neurotypical children, or b) designing inclusive interventions, which meet the needs of children across the spectrum of neurodiversity.

Objectives: This session will increase delegate’s understanding of the: 1. Health risks associated with extremes of neurodiversity in children 2. Barriers and facilitators to healthy lifestyle care for children with NNDs 3. Characteristics of inclusive, evidence-based nutrition and physical activity interventions 4. Opportunities for inclusive research within ISBNPA Summary: Presentations in this symposium are linked by addressing a common thread of how we can create inclusive behavioral nutrition and physical activity research. We will give voice to a variety of perspectives related to the health and wellbeing of children with NDDs, from those closely involved in their care, to a broader public health perspective based on epidemiological data. We provide concrete examples of the application of frameworks to promote inclusive health behavior research. Although NDDs are complex and may co-occur, Autism spectrum disorder (ASD) will be a major focus of these presentations because ASD has received increasing attention in recent decades due to the reported rise in prevalence.

Format: 1. Chair’s introduction – Holly Harris 2. Individual presentations – Rachel Blaine, April Bowling and Holly Harris 3. Summary from the expert discussant – Linda Bandini 4. Facilitated discussion between presenters and delegates

Interaction: The audience will be engaged through live online survey technologies.

Balancing Clinical Priorities with the Needs of Families: An Exploration into Healthy Lifestyle Care for Autism

Cynthia Banuelos¹, Michelle Barrack¹, Assistant Professor Rachel Blaine¹, Katie Cheng¹, Harmony Crawford¹, Brooke Dekofsky¹, Aaron Leal¹

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Special Interest Group: G. Children and families (SIG)

Purpose: Describe practice interests and priorities in addressing healthy lifestyle-related care (i.e., nutrition, physical activity, balanced screen use, and sleep) among children with autism spectrum disorder (ASD) among medical professionals and parents.

Methods: This qualitative study utilized in-depth interviews to compare, contrast, and describe the perspectives of interdisciplinary medical professionals and parents of autistic children regarding healthy lifestyle-related care for children with ASD. Using an open-ended semi-structured interview guide, participants were asked to identify priorities for healthy lifestyle care, barriers/facilitators to care, and desired resources for education and support. Interviews were audio-recorded, transcribed, verified by researchers, and double coded using the constant comparative method. All study participants resided in California in the United States.

Results: A variety of medical professionals (n=21) participated in the study and included developmental pediatricians, occupational therapists, speech-language pathologists, board certified behavior analysts, and registered dietitian nutritionists. Parents also participated (n=25) and described their children with ASD whose ages ranged between 3-15 years (mean=6.8 years). About half of parents identified as Latinx/Hispanic. Several key themes emerged during the study. Medical professionals specifically attributed a lack of knowledge, insufficient training, time-constraints, and parental limitations as barriers to offering care, particularly related to nutrition. Parents expressed distress about some providers' understanding of day-to-day behavioral challenges associated with autism, and thus being unable to give realistic advice. Most parents identified an urgent need to address sleep and child feeding as priorities for care, while providers indicated that poor growth or major behavioral/mental health challenges would likely be the only reason to initiate care. Both groups described a lack of awareness of qualified professionals or accessible referral networks and an inability to identify evidence-based resources to address healthy lifestyle care for this population.

Conclusions: Future research should continue to explore how to adapt and enhance clinical practice to address the unique needs of all children with neurodevelopmental disabilities, including autism. Interdisciplinary medical providers may benefit from training to better understand the needs of families and to help them problem-solve and prioritize areas for care, especially for issues that impact quality of life, such as selective eating and sleep.

Use of Inclusion Team Science to Adapt Telehealth Coaching Interventions to Improve Health Habits in Youth with Psychiatric and Neurodevelopmental Diagnoses

Associate Clinical Professor Sarah Benes¹, Associate Professor Amanda Staiano², Assistant Professor April Bowling¹

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Special Interest Group: G. Children and families (SIG)

Purpose: Describe the process of adapting telehealth coaching in an evidence-based intervention to improve physical activity engagement, nutrition and sleep habits among youth with psychiatric and neurodevelopmental diagnoses (PND), as well as lessons learned for future research and practice.

Methods: Using an inclusion team science framework, telehealth coaches were trained using an interactive workshop and scripts to implement a pilot study among youth with heterogeneous PND including autism; the telehealth intervention was previously developed and tested in typically developing (TD) children with overweight/obesity. Coaches were interviewed using an open-ended semi-structured interview guide after the pilot intervention was completed to evaluate their experiences and identify areas for improvement. Interviews were audio-recorded and transcribed, and emergent themes were identified by the research team.

Results: All coaches implementing the intervention participated in interviews (n=4, all male). One reported previous experience working with children with developmental disabilities; none had worked with youth with other psychiatric diagnoses. All coaches reported that training they received prior to working with study participants (n=11, ages 10-17) prepared them well; they were able to engage participants with PND in sessions as well as TD participants. Several coaches reported concerns about working with children with PND prior to intervention but quickly built rapport with participants and enjoying the coaching experience. Two reported the most important adaptation was increased use of positive behavioral reinforcement with the PND population. All coaches found that parent engagement and child age were important predictors of health habit change over the course of the intervention. Three coaches mentioned needing more flexibility from the coaching scripts to better engage participants with PND. Finally, all coaches reported that use of the technologies in the intervention (Xbox-based exergames, Skype, and Fitbits) was more challenging for participants with PND when compared to implementation among TD participants.

Conclusions: Telehealth coaching to improve health habits among youth with heterogeneous PND is feasible with specific adaptations and targeted coach training. Creating models for adaptive telehealth coaching using an inclusion team science framework may be useful for integrating physical activity, nutrition and sleep intervention into clinical treatment plans for youth with PND.

Child autistic traits, food selectivity and diet quality: A population-based study

Dr. Holly Harris¹, Ms. Yuchan Mou¹, Associate Professor Trudy Voortman¹, Prof. Pauline Jansen¹

¹Erasmus Medical Center, Rotterdam, Netherlands

Special Interest Group: G. Children and families (SIG)

Purpose: Children with Autism Spectrum Disorders (ASD) tend to have sensory disturbances and behavioral rigidity which may predispose them to be selective in their food intake, potentially compromising their nutritional status. While ASD diagnoses capture severe levels of impairment, autistic traits vary on a continuum throughout the general population. Yet, little is known about how subclinical autistic traits relate to dietary intake. This study, therefore, examines how autistic traits throughout early childhood are associated with diet quality (DQ) in mid-childhood, and explores the mediating role of food selectivity.

Methods: Participants were children (n=4061) from the population-based birth cohort, the Generation R Study (the Netherlands). Parents completed assessments on their child's autistic traits at 1.5, 3 and 6 years, food selectivity at 4 years and food intake at 8 years (via a Food Frequency Questionnaire), from which a DQ score (comprising 10 food groups, scale 0 to 10) was derived based on adherence to age-specific dietary guidelines. Multiple linear regression models examined the association between autistic trait SD score at each assessment wave and DQ. A mediation analysis was performed using structural equation modeling to examine the indirect effect of autistic traits at 3 years and DQ at 8 years through food selectivity at 4 years. Models adjusted for child sex, age, energy intake, ethnicity, birth weight, BMIz score, and maternal age and education.

Results: Autistic trait SD score at each wave was inversely associated with DQ (e.g. 3 years: $\beta = -0.06$; 95% CI: -0.10, -0.03). Post-hoc analyses showed that associations between autistic traits and DQ were consistently driven by lower scores on fruit, vegetable and whole grain food groups at each wave. The indirect effect of food selectivity ($\beta = -0.03$, 95% CI: -0.03, -0.02) explained 60% of the total association between autistic traits and DQ.

Conclusions: Expression of autistic traits across childhood is associated with poorer DQ in mid-childhood, and food selectivity may be one key behavioral mechanism explaining this association. Dietary interventions intended to optimize nutrition in children with elevated autistic traits may integrate behavioral strategies to support parents' appropriately responding to and managing food selectivity.

S3.26 - Advances in food insecurity measurement: Implications for public health and policy research, June 10, 2021

Chair: Meg Bruening, Associate Professor, Arizona State University

Discussant: Brenna Ellison, University of Illinois at Urbana-Champaign

Purpose: To describe emerging research in food insecurity measurement in the US and internationally. Rationale: Food insecurity remains a persistent public health problem, only exacerbated by the global COVID pandemic. Food insecurity has been linked to poorer dietary intake, mental health, and chronic disease across the lifespan. While food insecurity measurement in the US and internationally have remained relatively unchanged for decades, novel research indicates that adaptations and additions to the measures may be needed. If resources remain static, then providing an accurate assessment of food insecurity is critical so that the limited resources can be targeted to populations most in need.

Objectives: Participants in this session will be able to: · Describe the current approaches and measures for food insecurity · Explain at least 2 methods to improve food insecurity measurement · Reflect on how they may change their assessment approaches in food insecurity in their research
Summary: This symposia will review current approaches to assessing food insecurity, followed by 3 research abstracts of innovative findings in assessing food insecurity, and a discussant synthesize the research and outline steps for future research and opportunities in this area. **Format:** - 7 min: Introduction by the chair (Meg Bruening, Arizona State University) to review current approaches to food insecurity measurement, including an interactive poll - 9 min: Eric Calloway (Gretchen Swanson Center for Nutrition), Understanding Household Resilience in the Context of Food Insecurity: A Theoretical Framework for the United States - 9 min: Matthew P. Rabbitt (US Department of Agriculture) Food-Security Status Misclassification Among the College Student Population: Evidence from Two Large State Universities - 9 min: Rafael Perez Escamilla (Yale University), Degree of food insecurity matters for policymaking: Findings from Latin America - 15 min: Brenna Ellison (University of Illinois), Discussant, including an interactive poll - 11 min: Q and A (if selected for the live session. If not, we will re-distribute the time to the presenting abstracts). **Interaction:** We will use polls to engage the audience during the introduction and discussant portions of the symposium. In order to make a relatively serious topic more fun, we will create a term list in which participants will mark a sheet once they hear a certain phrase in the presentations. Each time they hear key phrases related to food insecurity measurement (e.g., Rasch model), they will be encouraged to do a short physical activity (e.g., jump up 2 times) while listening to the session.

Understanding Household Resilience in the Context of Food Insecurity: A Theoretical Framework for the United States

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Special Interest Group: I. Socio-economic inequalities (SIG)

Purpose: To develop a theoretical framework for understanding household resilience in the context of food insecurity in the United States. Examining household resilience and its relationship with risk for food insecurity is an emerging concept. Most of the formative work has been conducted outside of the United States – largely in developing nations.

Methods: Semi-structured interviews have been completed with a demographically diverse sample of adults (n=45) across five states (MD, TN, AR, NE, and CA). Interviewees were recruited from sites that serve populations at risk for food insecurity (e.g., food pantries, low-cost clinics, and low-income community programs). The qualitative approach of this study is best characterized as phenomenological research with a goal of understanding the commonalities of the lived experiences of food insecurity and its perceived relationship with household resilience. The study will include a thematic analysis with Creswell's "lean coding" technique. Themes will be largely inductive, but will be explored within a priori household resilience concepts identified in the literature. These concepts include absorptive capacity (household's ability to minimize exposure to financial shocks); adaptive capacity (household's ability to make informed choices about alternative livelihood strategies); transformative capacity (conditions largely outside of the household that are necessary to foster long-term resilience). Interviews have just completed, and analysis has begun (below are preliminary findings, with final analysis to be completed prior to the conference).

Results: Preliminary emerging themes within absorptive capacity include income adequacy, buffers against financial shocks, instrumental social support, and stability of necessities. Preliminary emerging themes within adaptive capacity include awareness and social connectivity, self-efficacy and stress coping, human capital, adaptive barriers, and assistance utilization. Preliminary emerging themes within transformative capacity include access to opportunities, governance, civic engagement/power, community social factors, and future oriented thinking.

Conclusions: This foundational work is being completed as part of a larger measurement development project. Findings will directly inform survey module development and testing. The resulting validated survey can be used for monitoring food insecurity risk related to household resilience and for informing the tailoring of community intervention approaches aimed at addressing root causes of food insecurity.

Food-Security Status Misclassification Among the College Student Population: Evidence from Two Large State Universities

Dr. Matthew P. Rabbitt¹, Dr. Brenna Ellison², Dr. Meg Bruening³

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Special Interest Group: I. Socio-economic inequalities (SIG)

Purpose: Research on college students in the US has produced high rates of food insecurity, with prevalence rates three to five times the national average. Given these high rates of food insecurity, researchers have questioned whether the USDA food security survey module is adequate for assessing food hardship among college students. Emerging research on this topic indicates that college students are responding to food-insecurity questions differently than other populations, which may contribute to higher-than-expected rates of food insecurity among college students. In this study, we quantify the extent to which college students are misclassified as food insecure based on existing food insecurity measures at two large, diverse universities.

Methods: Cross-sectional data on food insecurity provided by college students (N = 2,651; 51% non-white; 72% female) from two large public universities collected between 2015 and 2021 were pooled and standardized. A student's food insecurity was assessed with either the six- or ten-item food-insecurity measure. Rasch models were used to calibrate food-insecurity scales and assign each student a continuous estimate of their food insecurity. The misclassification methodology developed by Rabbitt and Engelhard (2021) for food insecurity research was used to estimate false positive and negative rates of food insecurity, examining differences by length of the survey.

Results: Nearly 6% of college students in our sample were classified as food insecure when they were truly food secure based on existing food-insecurity measures; however, about three percent of students were classified as food secure when they were truly food insecure. If we were to account for this measurement error, our estimate of food insecurity among college students would decrease from 37.5 to 35.2 percent. Moreover, misclassification rates are the highest when shorter food-insecurity measures are used. College students administered the six-item food-insecurity measure (14% misclassified) were twice as likely to have their food insecurity status misclassified as those administered the 10-item food-insecurity measure (7% misclassified).

Conclusions: Refinement of food-insecurity measures for the college student population are needed in the future and where possible researchers should consider longer survey modules to reduce measurement error for ongoing assessments.

Why identifying households by degree of food insecurity matters for policymaking: Global findings

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Special Interest Group: I. Socio-economic inequalities (SIG)

Purpose: Experience-based food insecurity indicators can be used to rank households or individuals across the continuum of levels of severity of food insecurity but often times studies only report HFI as a dichotomous variable. This study examined the policy relevance of reporting different levels of severity of Household Food Insecurity (HFI), e.g. food secure, mild-, moderate-, severe- HFI.

Methods: Nationally representative surveys were examined to describe the distribution of different levels of HFI by key socioeconomic characteristics from the national to the municipal level. A literature search was conducted to identify studies (N=16) across world regions examining the relationship between HFI severity level with: a) mental health, b) physical health, c) weight status, d) the double burden of malnutrition, d) chronic diseases including type 2 diabetes and hypertension among adults, e) maternal anemia, f) child stunting and b) early childhood development.

Results: The great majority of studies measured HFI with versions of the U.S. Household Food Security Survey Module, the Food Insecurity Experience Scale (FIES), the Latin American and Caribbean Food Security Scale (ELCSA), or The Brazilian Food Insecurity Scale (EBIA). There was strong variability in the distribution of different HFI levels across regions, states and municipalities and by socio-economic indicators. In countries like Brazil there were HFI reductions between 2004 and 2014 in response to more equitable social and economic policies followed by a rebound in severe HFI as a result of major social, economic and political instability. The great majority of studies detected dose-response or curvilinear relationships between FI levels and diverse physical and mental health outcomes, and early childhood nutrition and development indicators. The dose-response relationships were strongly consistent across world regions for overall wellbeing and mental health outcomes among adults and stunting among children.

Conclusions: Reporting on different HFI levels is key for designing, targeting and evaluating policies and programs. HFI can only be properly understood and effectively addressed by assessing and reporting from local to global settings on all its levels of severity.

S3.27 - Dietary patterns across the lifespan: A spotlight on the evidence used to inform the Dietary Guidelines for Americans, 2020-2025, June 10, 2021

Chair: Julie Obbagy, Nutritionist, USDA, CNPP, NESR

Discussant: Claire Brown, Nutritionist, USDA

PURPOSE: This symposia will showcase the state of the science on dietary patterns and health across the lifespan by spotlighting systematic reviews conducted by the 2020 Dietary Guidelines Advisory Committee with support from USDA's Nutrition Evidence Systematic Review (NESR) team to inform the Dietary Guidelines for Americans, 2020-2025.

RATIONALE: The Dietary Guidelines for Americans provide advice to promote health, reduce chronic disease risk, and must be based on the preponderance of current scientific and medical knowledge. To inform the Dietary Guidelines for Americans, 2020-2025, the 2020 Committee examined evidence on dietary patterns and health outcomes across the lifespan. Early editions used evidence that examined individual nutrients, foods, and food groups and health. In recent years, focus has been placed on dietary patterns due to recognition that nutrients and foods are not consumed in isolation. Rather, people consume them in various combinations over time—a dietary pattern—and these foods and beverages act synergistically to affect health. Research shows that consuming a healthy dietary pattern aligned with the Dietary Guidelines is associated with a range of health benefits, across life stages. Yet, most Americans are not eating according to the Dietary Guidelines, with average Healthy Eating Index (HEI) scores at 59 out of a possible 100.

OBJECTIVES 1) Present results from systematic reviews examining dietary patterns and health across the lifespan 2) Describe limitations and gaps in the available evidence that warrant future research. 3) Overview the Dietary Guidelines for Americans, 2020-2025 and resources for implementation. **SUMMARY:** The state of the science on dietary patterns in relation to disease prevention will be presented. The preponderance of evidence confirms that consuming a healthy dietary pattern as outlined in the Dietary Guidelines is related to better health. We welcome discussion on efforts to improve dietary patterns to align with the Dietary Guidelines and better reduce disease risk.

FORMAT: The chair will overview the process to develop the Dietary Guidelines for Americans. Presenters will share findings on dietary patterns during pregnancy and lactation and dietary patterns across the lifespan in relation to multiple outcomes. Discussion will include how these reviews were used in combination with other scientific approaches to inform the Dietary Guidelines that are relied on by Federal agencies to inform food and nutrition programs and initiatives.

INTERACTION: Presenters will utilize the interactive chat to answer questions during presentations, and engage attendees in discussing how to promote behavior changes to align with the Dietary Guidelines.

Systematic Reviews of the Relationship between Dietary Patterns and Gestational Weight Gain and Postpartum Weight Loss

Dr. Ramkripa Raghavan^{1,2}, Dr. Sharon Donovan³, Dr. Kathryn Dewey⁴, Dr. Rachel Novotny⁵, Dr. Jamie Stang⁶, Dr. Elsie Taveras^{7,8}, Dr. Ronald Kleinman⁷, Dr. Julie Nevins^{1,2}, Ms. Sara Scinto-Madonich^{1,2}, Dr. Julia Kim^{1,2}, Ms. Gisela Butera^{1,2}, Ms. Nancy Terry⁹, Ms. Jean Altman¹⁰, Ms. Meghan Adler¹⁰, Dr. Julie Obbagy², Dr. Eve Stooddy¹⁰, Ms. Janet de Jesus¹¹

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Special Interest Group: K. Disease prevention and management

Purpose: Discuss the findings from select systematic reviews, focused on women who are pregnant or lactating, conducted by the 2020 Dietary Guidelines Advisory Committee with support from the USDA's Nutrition Evidence Systematic Review (NESR) team. Specifically, the presentation will highlight two systematic review questions regarding the relationships between dietary patterns and 2 outcomes: gestational weight gain (GWG) and postpartum weight loss (PPWL).

Methods: The Committee developed protocols that described how they would use NESR's systematic review methodology to examine the systematic review questions. NESR conducted a literature search and dual-screened the results using pre-defined inclusion and exclusion criteria to identify articles published between Jan 2000 and Nov 2019. NESR extracted data and assessed risk of bias of included studies. The Committee synthesized the evidence, developed conclusion statements, and graded the strength of the evidence underlying the conclusion statements.

Results: Twenty-six articles were included in the GWG review and 1 article in the PPWL review. The GWG review included 5 RCTs and 21 prospective cohort studies. Two RCTs showed that a "beneficial" DP was associated with lower GWG. Thirteen of the 20 observational studies showed an association between DP and GWG. Although the DPs examined were characterized by different combinations of foods and beverages, the patterns consistently associated with lower GWG were higher in vegetables, fruits, nuts, legumes, and fish and lower in added sugars and red and processed meats. The PPWL review included only one RCT, which was limited by high attrition, issues with implementing the intervention, and lack of blinding.

Conclusions: Limited evidence suggests that certain DPs during pregnancy are associated with a lower risk of excessive GWG. These patterns are higher in vegetables, fruits, nuts, legumes, and fish, and lower in added sugar, and red and

processed meat (Grade: Limited). Insufficient evidence is available to determine the relationship between DPs during lactation and PPWL (Grade: Grade Not Assignable).

NESR Systematic Reviews: Dietary patterns at each life stage and health outcomes across the lifespan

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Special Interest Group: K. Disease prevention and management

Purpose: Overview findings from systematic reviews conducted by the 2020 Dietary Guidelines Advisory Committee with support from USDA's Nutrition Evidence Systematic Review (NESR) team that examined dietary patterns at each stage of life and health outcomes across the lifespan, with specific reviews highlighted in-depth.

Methods: The Committee developed protocols that described how they would use NESR's systematic review methodology to examine the evidence. NESR librarians conducted peer-reviewed literature searching in at least 3 databases. NESR analysts, guided by analytic frameworks and pre-defined inclusion and exclusion criteria for each systematic review question, dual-screened literature search results to identify relevant articles. NESR extracted data and assessed risk of bias of included studies. Committee members reviewed and synthesized the evidence, formed conclusion statements, and graded the strength of the evidence supporting those conclusions.

Results: Components of a "healthy dietary pattern" commonly associated with favorable health outcomes included vegetables, fruits, legumes, whole grains, low- or non-fat dairy, seafood, nuts, and unsaturated vegetable oils, and low consumption of red and processed meats, sugar-sweetened foods and drinks, and refined grains. The evidence in adults was graded as Moderate or Strong for the following outcomes: all-cause mortality, bone health, breast cancer, colon cancer, cardiovascular disease, overweight and obesity, and type 2 diabetes; and graded as Limited for neurocognitive health, lung cancer, and prostate cancer outcomes. Insufficient evidence was available for the outcome of sarcopenia. Relative to adults, insufficient evidence was available that examined dietary patterns consumed by children and adolescents and most of these outcomes. However, limited evidence was available for children and adolescents that suggests a similar healthy dietary pattern is associated with better health outcomes for CVD risk factors and adiposity.

Conclusions: A healthy dietary pattern consisting of vegetables, fruits, and whole grains is associated with better health outcomes across the lifespan, although the strength of evidence varies. More evidence is needed to determine the relationship between dietary patterns and sarcopenia in adults, as well as dietary patterns consumed during infancy and toddlerhood, childhood, and adolescence.

How the science-base is translated into the Dietary Guidelines for Americans and informs MyPlate messages and materials

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¹Center for Nutrition Policy and Promotion, Food and Nutrition Service, United States Department of Agriculture, Alexandria, United States of America

Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: Overview how the work of the 2020 Dietary Guidelines Advisory Committee is translated into the Dietary Guidelines for Americans, which in turn informs Federal programs, such as MyPlate's Start Simple tools and resources.

Methods: The Committee used three approaches to examine the evidence. Data Analysis from national datasets helps us understand the current health status and dietary intakes of Americans. It is what makes the Dietary Guidelines "for Americans." Food Pattern Modeling allows the Committee to develop healthy dietary patterns that promote health and meet nutrients needs. Systematic Reviews of the evidence allows the Committee to synthesize all of the relevant peer-reviewed studies on a diet and health topic. Each of these approaches has its own rigorous, protocol-driven methodology, and plays a unique, complementary role in examining the science. These approaches inform the Committee's scientific report. USDA and HHS use the scientific report as the scientific basis for revisions to the Dietary Guidelines for Americans, along with a review of public and agency comments. USDA and HHS then release the next edition of the Dietary Guidelines that provides central guidance to inform Federal nutrition programs, including MyPlate tools and resources that provide tips and strategies to help Americans improve their diet.

Results: The Dietary Guidelines for Americans demonstrates that American diets are falling short from meeting key recommendations. Implementation strategies to help Americans improve their diets are needed. Personalized advice and strategies can better meet people where they are to start making behavior changes. MyPlate.gov and the Start Simple with MyPlate app were both designed to help Americans customize and personalize their healthy eating goals to improve their dietary patterns to better align with the Dietary Guidelines.

Conclusions: Personalized advice provided through interactive tools such as MyPlate.gov and the Start Simple with MyPlate app can better meet people where they are to help them improve their dietary patterns to align with the Dietary Guidelines, which science demonstrates can promote health and reduce disease risk.

S3.28 - COVID-19 restrictions are adversely affecting children's movement behaviours: How do we protect and support healthy movement behaviours for kids and their families during a pandemic?

June 10, 2021

Chair: Leigh Vanderloo, ParticipACTION

Discussant: Mark Tremblay, CHEO Research Institute

Purpose: This symposium will describe the findings from a multi-method, repeated cross-sectional national study on the impact of COVID-19 on healthy movement behaviours of children and families. Surveys were distributed to 1,500 parents April 2020, 1,500 parents October 2020, and 1,500 parents April 2021. Follow-up interviews were conducted with parents in June-July 2020. Presenters will describe the 24-hour movement behaviours across the pandemic and provide strategies to promote child and family health as we recover from this global health crisis. Rationale: Children who meet the 24-hour movement behaviour guidelines (i.e., sufficient physical activity, limited sedentary behaviours, and adequate sleep) tend to have better physical and mental health. In March 2020, the WHO characterized the COVID-19 virus outbreak as a global pandemic. As a result, children and their families experienced changes in their daily lives.

Objectives: To describe the movement behaviours of children across the COVID-19 pandemic; to describe the factors associated with adherence and non-adherence to the movement guidelines in children across the COVID-19 pandemic; and to describe parents' experiences of the impact of the COVID-19 pandemic on the movement behaviours of their children.

Summary: Dr. Leigh Vanderloo will introduce the symposium. Dr. Sarah Moore will describe children 24-hour movement behaviours (physical activity, sedentary behaviour, sleep) during the pandemic, drawing from the results of national surveys conducted in April 2020, October 2020, and April 2021. Dr. Michelle Guerrero will describe factors associated with adherence to the movement behaviour guidelines during the pandemic for children. Dr. Guy Faulkner will describe how parents adapted to the pandemic and how this affected their children's 24-hour movement behaviours, drawing from follow-up interviews results. Dr. Mark Tremblay will facilitate a discussion regarding implications of the studies.

Format: 1. Introduction [4min] 2. Presentations a) The impact of the COVID-19 virus outbreak and related restriction on movement behaviours of children: Findings from national surveys [12min] b) What factors predict adherence and non-adherence to the 24-hour movement guidelines for children during the COVID-19 pandemic? Findings from national surveys [12min] c) "You can't go to the park": Exploring parental experiences of COVID-19 and its impact on their children's movement behaviours [12min] 3. Implications, Q&A [15min] 4.

Conclusions [5min] Interaction: This will be an interactive session. Delegates will be encouraged to post questions for Q&A. This will allow the presenters to respond in a timely fashion and foster meaningful interactions between delegates and presenters.

The impact of the COVID-19 virus outbreak and related restriction on movement behaviours of children: Findings from national surveys

Dr. Sarah Moore¹, Dr. Guy Faulkner², Dr. Ryan Rhodes³, Dr. Leigh Vanderloo⁴, Dr. Leah Ferguson⁵, Dr. Mariana Brussoni², Dr. Raktim Mitra⁶, Ms. Tala Chulak-Bozzer⁴, Dr. Norm O'Reilly⁷, John Spence⁸, Prof. Mark Tremblay⁹

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Special Interest Group: G. Children and families (SIG)

Background: Healthy childhood development is fostered through sufficient physical activity (PA; including time outdoors), limiting sedentary behaviours (SB), and adequate sleep; collectively known as movement behaviours. In March 2020, the WHO characterized the COVID-19 virus outbreak as a global pandemic. As a result, restrictions were imposed, limiting community and social gatherings, sport, playground and park use. Thus, the aim of this study was to examine the impact of COVID-19 restrictions on movement and play behaviours in children and youth.

Methods: We distributed surveys to Canadian parents that assessed changes in child movement and play behaviours during the COVID-19 outbreak in April 2020, October 2020, and April 2021. At each time point, 1,500 surveys were distributed. The repeated cross-sectional survey assessed pandemic-related changes in child physical activity, sedentary behaviours, and sleep, as well as family demographics and parental factors that may influence movement behaviours. Correlations between behaviours and demographic and parental factors were determined. For open-ended questions (e.g., innovative child/family activities), we summarized word frequency distributions.

Results: Less than 5% of children and youth were meeting the combined movement behaviour guidelines during COVID-19 restrictions. Children and youth had lower PA levels, less outside time, higher SB (including leisure screen time), and more sleep during the outbreak. Parental encouragement and support, parental engagement in PA, and family dog ownership were positively associated with healthy movement behaviours. Although families spent less time in PA and more time in SB, several parents reported adopting new hobbies or accessing new resources. Data from all time points (immediate, 6-month, 12-month) for PA, SB, sleep, and the combined 24-hour movement behaviour guidelines will be reported during the symposium.

Conclusions: Our study provides evidence of collateral consequences immediately after COVID-19 restrictions were imposed. These consequences continued months into the pandemic, clearly demonstrating an adverse long-term impact on the movement and play behaviours of Canadian children and youth. Findings from our surveys highlight the challenges that families are experiencing in maintaining healthy behaviours during a global health crisis.

What factors predict adherence and non-adherence to the 24-hour movement guidelines for children during the COVID-19 pandemic? Findings from national surveys

Dr. Michelle Guerrero¹, Dr. Leigh Vanderloo², Dr. Ryan Rhodes³, Dr. Guy Faulkner⁴, Dr. Sarah Moore⁵, Prof. Mark Tremblay¹

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Special Interest Group: G. Children and families (SIG)

Background: Evidence has shown that sufficient levels of physical activity (PA), limited sedentary behaviours (SB), and adequate sleep are linked to physical and mental well-being among children and youth. However, during the COVID-19 pandemic, fewer children and youth were meeting PA, SB, and sleep recommendations (i.e., the 24-hour movement behaviours). The purpose of this study was to use novel decision tree modeling to generate profiles of children and youth who were more or less likely to meet the Canadian 24-h movement guidelines during the coronavirus disease-19 (COVID-19) outbreak in the first year of the pandemic.

Methods: Data for this study were from nationally representative samples of Canadian parents of children (5-11 years old) or youth (12-17 years old). Data were collected in April 2020, October 2020, and April 2021 via an online survey. Survey items assessed demographic, behavioural, social, micro-environmental, and macro-environmental characteristics. Decision trees of adherence and non-adherence to all movement recommendations combined and each individual movement recommendation were generated.

Results: Results revealed specific combinations of adherence and non-adherence characteristics. Characteristics associated with adherence or non-adherence to the recommendation(s) included parental perceived capability to support healthy behaviours, annual household income, children's and youth's outdoor PA/sport since the COVID-19 outbreak began, gender, parental age, and changes in children's and youth's healthy behaviours since the COVID-19 outbreak began. We will report the specific combinations of adherence and non-adherence characteristics from all time points (immediate, 6-month, 12-month) during the symposium.

Conclusions: This study aimed to generate models that describe profiles of school-aged children and youth (5–17 years old) who were more or less likely to meet the 24-h movement behaviors during the first year of the COVID-19 outbreak. Our results show that specific characteristics interact to contribute to adherence and non-adherence to the movement behaviour recommendations. Results highlight the importance of targeting parents' perceived capability for the promotion of children's and youth's healthy movement behaviours during challenging times of the COVID-19 pandemic.

“You can’t go to the park”: Exploring parental experiences of COVID-19 and its impact on their children’s movement behaviours

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¹University of British Columbia, Vancouver, Canada, ²Dalhousie University, Halifax, Canada, ³Children’s Hospital of Eastern Ontario Research Institute, Ottawa, Canada

Special Interest Group: G. Children and families (SIG)

Background: Habitual healthy movement behaviours are important contributors to child mental and physical health. The COVID-19 pandemic and related public health recommendations have changed the daily lives of Canadians and restricted opportunities for healthy movement behaviours for children. Despite the known health benefits, very few children were meeting the movement behaviour guidelines during the pandemic. The purpose of this study was to use qualitative methods to explore how parents experienced the pandemic-related restrictions and how they impacted their children’s movement behaviours.

Methods: Parents who participated in a national cross-sectional survey, and who expressed interest in participating in an interview at the end of the survey, were contacted by email. Twenty-nine semi-structured one-on-one interviews were conducted (June-July 2020) with parents of children (5-11 years old). The interview questions explored changes in movements due to the pandemic, parental approaches to supporting healthy movement and play behaviours during the pandemic, pandemic-related restrictions in the parent’s geographic area, and existing and anticipated barriers and facilitators to movement and play. Interviews lasted 24-104 minutes, were audio-recorded, transcribed verbatim, and thematically analyzed.

Results: Findings emphasized various individual (e.g., motivation), interpersonal (e.g., parent work schedule), built (e.g., closure of parks) and natural environment (e.g., weather) factors related to children’s movement behaviours. The findings highlighted the loss of structured activities and destinations for children’s physical activity, and restricted opportunities for outdoor play exacerbated by shrinking childhood independent mobility, with additional dramatic increases in screen time. During the symposium we will highlight challenges that parents are facing during the pandemic and strategies families are employing to support their children to maintain healthy movement behaviours.

Conclusions: The COVID-19 pandemic has significantly impacted children’s movement behaviours. Families are trying to cope but are faced with a number of challenges, including adhering to public health restrictions, juggling multiple roles, conducting work and school from home, as well as exacerbating factors like weather. It will be important to continue to encourage outdoor time, support policies and practice that facilitate independent mobility, and develop centralized resources that help families in the maintenance of healthy movement behaviours as families recover from this global health crisis.

Presentations on Demand

A comparison of a self-report questionnaire and accelerometry to assess physical activity changes in a longitudinal study

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Special Interest Group: J. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

Purpose: Physical activity (PA) is a complex and multifaceted behavior, which makes assessment of all aspects in one single method complicated. Questionnaires and accelerometers are most commonly used to assess PA in large-scale studies. As the ability to detect changes in PA (i.e. responsiveness) is critical in intervention studies and not yet studied extensively, we aimed to compare outcomes of the Short Questionnaire to Assess Health-enhancing PA (SQUASH) with ActiGraph outcomes in a population of prostate and colorectal cancer patients.

Methods: Prostate and colorectal patients (n=478) wore an ActiGraph GT3X-BT for seven days and completed the SQUASH questionnaire afterwards at two time points (baseline and 6 months). Validity and responsiveness were assessed using Spearman's rho, intraclass correlation coefficients A(ICC) and Bland-Altman plots. In addition, agreement, sensitivity and specificity between both measurement methods were assessed for the classification of participants having increased their PA or not (κ -statistic).

Results: At baseline correlations between both measures for time spent in light PA (LPA), moderate to vigorous PA (MVPA) and the number of days with ≥ 30 min PA were low to moderate ($\rho=.152$, $\rho=.356$ and $\rho=.387$ respectively). Bland-Altman plots showed substantial higher MVPA and lower LPA for the SQUASH compared to the ActiGraph. Correlation and agreement for change in LPA were lacking and low for MVPA, but increased when both methods concerned the exact same measurement week at both time points. Agreement in the classification of individual participants having increased their MVPA was poor (MVPA: $\kappa .13$; Days with ≥ 30 min PA: $\kappa .16$).

Conclusions: Absolute MVPA from the SQUASH was substantially higher than ActiGraph MVPA, whereas SQUASH LPA was substantially lower than ActiGraph LPA. At the individual level classification of change in MVPA was limited, but at the group level the SQUASH has reasonable validity in assessing change in MVPA. Self-reported PA may be appropriate for ranking individuals or comparing groups, but may not provide accurate absolute values of PA. Absolute ActiGraph PA may be more reliable, yet accelerometers also have limitations with regard to measuring specific movements (e.g. cycling) or distinguishing the domain of PA (e.g. leisure time, occupational, etc).

A qualitative exploration of the impact of the COVID-19 pandemic on young Australian adults' food purchasing, planning and consumption behaviours

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Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: Young Australian adults' exhibit poor dietary behaviours. These include increased consumption of Energy Dense, Nutrient Poor (EDNP) foods, sugar sweetened beverages and low consumption of fruits and vegetables. However, little is known about how the COVID-19 pandemic may have further accentuated young Australian adults' pre-existing adverse dietary behaviours. Therefore, this research aimed to gain an understanding of the impact of the COVID-19 pandemic on food purchasing, planning and consumption behaviours by exploring views and experiences of young adults living in Australia. The innovation of this study resides in the unexpected timing of the pandemic which provided a unique opportunity to study this groups' food behaviours under unforeseen, changing conditions.

Methods: In this phenomenological study, semi-structured interviews were employed to gather data from participants. Three criteria for eligibility were outlined. Young adults needed to be aged between 18-30 years, English speaking and living in Australia. Thirty-eight participants were interviewed via online platforms or over the phone. The interviews were transcribed and analysed thematically.

Results: Three themes emerged: First, changes in food practices. Second, factors associated with heightened psychological distress and lastly disruption of routine lifestyle and activities. This study identified more negative and few positive changes in food behaviours. The negative changes included an increase in consumption of EDNP foods, decreased purchase and consumption of fresh foods, increased consumption of foods prepared outside of the home, adverse eating patterns and lack of meal planning. Positive changes included decreased consumption of foods prepared outside of the home and smaller more frequent meals. Additionally, an increase in home-cooking and decreased consumption of EDNP foods were reported.

Conclusions: This study identified important changes in food behaviours that may have negatively intensified young Australian adults' pre-existing poor food behaviours during the COVID-19 pandemic. This research is significant as it is one of the first studies that has qualitatively explored the impact of COVID-19 on food purchasing, planning and consumption behaviours of young Australian adults. Findings may help guide future behaviour change interventions and public health programs aimed at protecting and promoting community health either during this pandemic or the next such episode.

A scoping review of physical activity interventions for older adults

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Special Interest Group: A. Ageing (SIG)

Purpose: To inform implementation and future research, this scoping review assessed reviews of the evidence for physical activity (PA) interventions among adults aged 60+ years. Our research questions are: (1) what is the evidence for interventions designed to increase total PA in adults aged 60+ years, in accordance with three of the four strategic objectives of GAPP (active societies; active environments; active people)?; (2) what is the current evidence regarding effectiveness of tailored PA programmes and services for older adults?; (3) what are evidence gaps requiring further research?

Methods: We searched PEDro, MEDLINE, CINAHL and Cochrane from 1 January 2010 to 1 November 2020 for systematic reviews of PA interventions in older adults aged 60+ years. We identified interventions designed to: (1) increase PA and (2) deliver PA programmes and services in home, community or outpatient settings. We extracted and coded data from eligible reviews according to our proposed framework informed by TiDier, Prevention of Falls Network Europe (PROFANE), and WHO's International Classification of Functioning, Disability and Health (ICF). We classified the overall effects as positive, negative or inconclusive.

Results: We identified 39 reviews of interventions aiming at PA and 342 reviews of PA programmes/services for older adults. Most of the reviews (290/342, 85%) reported positive overall findings for physical and cognitive/emotional function outcomes. Interventions were predominantly structured exercise programs, including balance strength/resistance training, and physical recreation (e.g., yoga and tai chi). There were few reviews of health promotion/coaching and health professional education/referral, and none of sport, workplace, sociocultural or environmental interventions. Fewer reported outcomes of overall PA, social participation and quality of life/well-being. We noted limited evidence for diverse and disadvantaged older adults and from low-middle income countries.

Conclusions: There is modest but growing evidence for interventions to increase PA in older adults, although more population-based health promotion and environmental interventions are needed. There is abundant evidence for specific PA programmes and services, but coverage of sport, workplace and diverse samples is lacking. A comprehensive review of evidence from individual studies is now needed as well as research targeting neglected outcomes, populations and settings.

A self-determination theory-guided family-based physical activity intervention: perceptions of facilitators

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Special Interest Group: G. Children and families (SIG)

Purpose: The purpose of this qualitative study is to provide an understanding of a self-determination theory (SDT) guided intervention program aimed at increasing physical activity of both children and parents from the perception of facilitators. We examined how SDT-tenets were operationalized within teaching strategies employed, and how basic need satisfaction led to behavioural changes.

Methods: Five semi-structured interviews with six facilitators (three females and three males) were conducted. Interviews were audio-recorded and conducted in Cantonese. Interviews were transcribed verbatim by trained research assistants. Both deductive (themes related to the SDT) and inductive (other aspects of the intervention and participants' behavioural changes) approaches of thematic analyses were conducted.

Results: Themes identified using deductive approach included (1) need-supportive teaching strategies and (2) participants behavioural changes. Inductive themes identified included (3) feasibility of the intervention and (4) implications and suggestions. Specifically, teaching strategies employed by facilitators provided support for participants' autonomy (i.e., provide choices of grouping), competence (i.e., let participants choose difficulty levels and compare with themselves) and relatedness (i.e., being more supportive in providing interactions). These resulted in high levels of parent engagement, improved motor skills in children and parent-child-facilitator relationships. Programme design, including theory-driven intervention components, combined mode for parents and children, provision of modified equipment, and strong researcher-facilitator communication were deemed feasible and effective. Facilitators felt the intervention could be further improved by providing standard assessment criteria, having stronger support from schools (e.g., provision of venue), and building trust and support from children and parents.

Conclusions: The findings demonstrated the feasibility and acceptability of implementing a SDT guided family-based physical activity classes from the perspective of facilitators. Further research could usefully explore perceptions from participants and long-term effects which may bring to participants.

Key words: Self-determination theory; family-based; physical activity; facilitators.

A social identity approach to community-based physical activity interventions: A case study from exercise referral

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Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: Social support is a primary facilitator of participant engagement in public health interventions, such as exercise referral schemes (ERSs). ERSs are internationally widespread physical activity interventions for insufficiently active adults with one or more health conditions. The provision and receipt of effective social support is underpinned by a subjective sense of social identification. Therefore, greater understanding of how to promote social identity can improve participant engagement among ERSs and wider public health settings. This study documents the application of a peer volunteer social identity approach to a UK-based ERS.

Methods: Three sets of semi-structured interviews were conducted with ERS participants (n = 38), providers (n = 5) and peer volunteers (n = 4) from an ERS in northwest England between 2018 and 2020. Interviews investigated (1) the feasibility of implementing a social identity approach, (2) the prospective acceptability of a peer-based approach in relation to desirable demographic and personal characteristics of ERS peers and valued peer roles, and (3) the retrospective acceptability of the peer intervention post implementation. All data were analysed thematically.

Results: The interviews generated three main themes, as follows: (1) The ERS presented a challenging context in which to implement a social identity approach due to a non-group-based delivery format and vast participant heterogeneity in relation to age, sex, and health status. The structured introduction of peer volunteers was selected to improve social support opportunities for participants, with peers acting as representatives and propagators of an ERS-specific social identity. (2) ERS participants de-emphasised the importance of demographic similarity between themselves and prospective peers in relation to age or sex, though peers must have previously completed the ERS and had experience of managing a personal health-related condition. Desired peers were individuals who could exude positivity and empathy whilst providing practical, informational, motivational, and emotional support. (3) Peers who performed these roles made participants feel more comfortable and socially supported during ERS, reducing burden on ERS providers.

Conclusions: These findings provide a methodological framework to inform the adoption of a social identity approach among ERSs and wider physical activity interventions using peer volunteers.

A two pronged approach to managing sarcopenia; contrasting the views of dietitians and exercise professionals

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Special Interest Group: A. Ageing (SIG)

Purpose: This work presents a unique perspective on the concept of role merging within the healthcare setting by exploring the views, opinions and attitudes of dietitians and exercise professionals on an emerging role of the dietitian prescribing exercise advice to older adults, for the prevention and treatment of sarcopenia.

Methods: Following ethical approval, a qualitative methodology was employed to explore the perspectives from two professional groups. The research used in-depth interviews and focus groups using a purposive sample of participants from each profession. Data was analysed inductively using Braun and Clarke's (2006) thematic analysis. Data was coded using latent and semantic coding, and then grouped into similar themes. Using triangulation, a narrative synthesis was conducted to compare the findings from the two professionals' perspectives, to inform future practice.

Findings: Four overarching themes emerged: 1) patient related benefits of a two-pronged approach; 2) risk management, competencies and training requirements; 3) levels of exercise intervention; and 4) efficiency and effectiveness. An overall positive response from both professional groups acknowledged the need for a two-pronged approach of nutrition and physical activity interventions for sarcopenia. Therefore health care professionals must work together to achieve improved clinical outcomes and manage increased patient demand. Basic messages around increasing physical activity and reducing sedentary behaviour were deemed a duty of care for all professionals as part of the Making Every Contact Count initiative (HEE, 2020). However, prescribed exercise advice was perceived as higher risk for patients in the frail older adult population, therefore advanced training for dietitians was advised before they consider offering prescriptive advice.

Conclusions: This study suggests role diversification may lead to service efficiency and improved patient care in the management of sarcopenia, however appropriate training and an agreed competency framework is required to ensure safe and effective delivery of exercise advice by dietitians. With an ageing population there is a need to change the way practitioners manage patient care (NHS, 2019), in addition, a call for dietitians to take on leadership roles in relation to the prevention of disease, to enable more holistic patient care (AHPs into Action framework, 2017; Hickson et al, 2017).

Accuracy of self-reported activity to predict weight changes during an exercise intervention

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Special Interest Group: J. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

Purpose: We examined the accuracy (bias and precision) of self-reported physical activity for predicting body weight changes following exercise training by quantifying physical activity energy expenditure (PAEE) in sedentary individuals who participated in a 15-week prescribed exercise intervention.

Methods: Using data from the Training Intervention and Genetics of Exercise Response (TIGER) study (2003–2015), physical activity (PA) rating, activity logs, rating of perceived exertion (RPE), and the Block food frequency questionnaire were used to predict changes in body weight after 15 weeks of aerobic exercise training. Body weight was estimated using the equations from the NIDDK Body Weight Planner program. PAEE was estimated using five different methods, four entirely self-reported and one including measured heart rate (HR), during the exercise intervention sessions. Weights were measured at baseline, at two interim timepoints during the intervention, and after the intervention. The average difference between the predicted and observed body weight changes represented bias (systematic error) of the predicted value, and the standard deviation of the differences represented its precision (random error).

Results/findings: A total of 1,565 TIGER participants were included in the analyses. Average pre-post measured weight change was -0.23 kg (SD=2.55). Using the objectively measured HR with self-reported RPE produced the lowest bias (2.54 kg) in predicting weight change. Using the self-reported activity logs with RPE was the best combination of low bias (3.20 kg) and good precision (± 8.57 kg) among the entirely self-reported methods.

Conclusions: Our results suggest that more accurate prediction of body weight change can be assessed by more refined self-reported measures including duration, activity, and intensity as well as training and instructing participants for accurate reports.

Active commuting to school among 42,074 Spanish children and adolescents: differences by educational levels, stages and school grades

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Special Interest Group: G. Children and families (SIG)

Purpose: The aim of this study was to examine differences in active commuting to school (ACS) between different and consecutive educational levels, educational stages and school grades, separately.

Methods: Data were obtained from 28 cross-sectional studies conducted across Spain in 2010-2017. The analytical sample comprised 42,074 participants; namely, 5,327 children aged 3-5.99 years old (48% girls), 18,329 children aged 6-11.99 years old (50.4% girls) and 18,438 adolescents aged 12-18 years old (49.3% girls). Individual data included participant's age, gender, and mode of commuting to school. The ACS was self-reported in the 28 studies using different questions; a final categorization was conducted into "active" (i.e., by walk/cycling and/or non-motorised scooter) and "passive" (i.e., by school bus/public bus/train/metro/taxi/moto and/or car). Participants were classified into educational levels, educational stages and school grades, aligning with the Spanish educational system based on age. Logistic regressions models were performed to analyze the associations between ACS and educational levels, ACS and consecutive educational stages from different educational levels, and ACS and consecutive school grades from different educational stages.

Results: Each educational level and stage was associated with the previous educational level and stage showing a higher odds (all, $p < 0.001$) respectively, except one case (i.e., adolescents in the first cycle of compulsory secondary education had lower odds of ACS than those in the third cycle of primary education; $p < .05$). There were no changes between consecutive school grades, except adolescents of first grade in the secondary education level who had lower odds of ACS than their counterparts of the last grade of primary education level ($p < .05$).

Conclusions: Overall, ACS increased in students from higher educational levels and stages, but ACS did not increase within consecutive school grades. Future interventions should focus on pre-primary education level that showed lower rates of ACS in order to acquire active habits in the early childhood.

Activity preferences of 9- to 10-year-old boys and the relationship between object control skills and physical activity levels: the NW-CHILD study

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Special Interest Group: I. Socio-economic inequalities (SIG)

Purpose: Fundamental motor skills are the platform for movement competency. Object control (OC) skills and socio-economic status (SES) can influence a child's participation in physical activity. There is a lack of research, especially in South Africa, regarding OC skills and SES and the influence it has on physical activity levels and patterns of boys. This study aimed to determine if there is a relationship between object control skills, SES and physical activity levels and patterns in boys aged nine- to 10 years in the North West Province of South Africa.

Methods: This is a cross-sectional study that made use of the secondary data that was gathered in 2013, from the original study, the NW-CHILD study (Child-Health-Integrated and Development). A total of 455 boys with the mean age of 9.9 years (± 0.41) participated in the study, out of the 455 boys, 179 was from high SES and 277 from low SES. The Test of Gross Motor Development Test was used to assess the boys' gross movement skills. The Children's Leisure Activities Study Survey questionnaire was used to determine the physical activity levels and patterns that the boys participated in. STATISTICA software was used to analyse the data by means of two-way tables, Spearman rang order correlations and independent t-testing.

Results/findings: Boys from low SES performed statistically ($p \leq 0.05$) and practically ($d \geq 0.3$) better regarding the kicking skills. However, boys from high SES performed statistically ($p \leq 0.05$) and practically ($d \geq 0.3$) better regarding the overhand throw, underarm roll and the OC standard score. Boys from high SES participated significantly ($p \leq 0.00$; $d = 0.83$; $d = 0.5$) more in moderate- and high-intensity activities. Lastly, positive correlations with a small effect ($r \geq 0.1$) was reported with riding a bicycle, hockey and basketball, while negative correlations with a small effect ($r \geq 0.1$) effect was found with gymnastics, walking the dog, playing on playground equipment and doing house hold chores.

Conclusions: The results determine the influence that well- and under-developed object control skills have on a child's physical activity levels and patterns. Furthermore, children from low SES tend not to be as physical active as their peers.

Adolescent girls' perceptions of their school neighborhood environment for walking and cycling to school

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Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: Walking is a more common mode of transport to school than cycling in many countries worldwide. Adolescents' have different perceptions of walking versus cycling to school, and therefore, these two modes need to be examined separately. Most previous studies investigated the associations between the built environment and active transport to school in home neighborhoods, while only a few studies focused on school neighborhoods. This study compared adolescent girls' perceptions of the school neighborhood environment for walking versus cycling to school.

Methods: Adolescent girls (n=68; age: 14.6±1.54) from two secondary schools in Dunedin, New Zealand, participated in the BEATS Natural Experiment study in 2020. Participants completed an online survey about the perceptions of school neighborhood environment for walking and cycling to school.

Results: In this sample, 33.8% of adolescent girls walked to school, and only 1.5% cycled. For walking to school, most adolescents reported enough footpaths in their school neighborhoods (79.4%), dangerous intersections (54.4%), the presence of crosswalks/signals (76.5%), diverse destinations within walking distance (75.0%), interesting scenery (58.8%), the presence of hills (66.2%), good lighting along the routes (80.9%), and a lot of noise along the routes (58.8%). For cycling, most adolescents reported high traffic volume (61.8%), dangerous intersections (54.5%), the presence of crosswalks/signals (64.7%), diverse destinations within cycling distance (61.8%), slippery routes (51.5%), the presence of hills (66.2%), good lighting along the routes (77.9%), and a lot of noise along the routes (54.4%). Fewer adolescents reported enough cycle paths versus footpaths (47.1% vs 79.4%; $p<0.001$), crossings and signals for cyclists versus pedestrians (64.7% vs 76.5%; $p=0.008$), and destinations with easy cycling versus walking distance (61.8% vs 75.0%; $p=0.002$) in their school neighbourhoods. In contrast, a greater proportion of adolescents reported too much traffic along with cycling versus walking routes (61.8% vs. 45.6%; $p=0.028$) in their school neighborhoods.

Conclusions: Adolescent girls from Dunedin, New Zealand, perceived the built environment of their school neighborhoods to be more supportive of walking versus cycling to school. Future built environment interventions in school neighborhoods to increase active transport to school need to be tailored to address walking- and/or cycling-specific barriers in a local context.

Adolescent obesity and nutritional choices comparison between South Africa and Europe

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Special Interest Group: K. Disease prevention and management

Purpose: Adolescent obesity increases risk of weight-related health challenges and stigma (Greydanus et al., 2018). The prevalence is rising in sub-Saharan Africa and linked to dietary practices (Sedibe et al., 2018). There is insufficient data to assess its driving factors in South Africa (SA). The purpose of this paper is to compare gender specific trends in overweight and obesity as well as eating habits between adolescents in SA and Europe over two decades.

Methods: Study data were extracted from SA Demographic and Health Surveys (1998 and 2016) and SA National Health and Nutrition Examination Survey (2012) for survey participants within 15 and 19 years old. Participants' measures extracted from the surveys are Body Mass index Z-score, sex, daily fruit, vegetable, and sugar-sweetened beverage (SSB) consumption. Chi-square test (X²) analyses were performed to assess significance of change in overweight/obesity proportion through three time points and compared within sex. Changes in daily fruit, vegetables and SSB consumption at two time points were also assessed. All significance is at $p < 0.05$. Results were compared with Health Behaviour in School-aged Children (HBSC) European 2018 data (Inchley et al., 2020).

Results: Adolescents' overweight/obesity proportion peaked at 23.50% in 2012 similar with HBSC report that showed 21% overweight/obesity in European adolescents by 2018. Girls showed trend of greater overweight/obesity proportions (1998 - 27%, 2012 - 34%, 2016 - 34%) than boys (10%, 10%, 9%) in contrast with Europe where proportion was lower in girls (14%) compared to boys (22%). Decrease in daily fruit (2012 - 57%, 2016 - 48%) and vegetable (55%, 50%) consumption were not significant but SSB consumption significantly increased ($X^2 = 22.5$, $p < 0.001$) compared to HBSC data where 48% did not consume fruit daily and 16% consumed SSB.

Conclusions: Preliminary data show nearly similar proportion of adolescents with abnormal weight, yet sex differences exist as girls are at greater risk in SA in contrast with Europe where boys face greater risk. Furthermore, daily poor nutritional choices especially with SSB consumption in SA is evident. Further analyses will show if these choices affect obesity prevalence in this cohort.

Adolescent sport participation trajectories are associated with physical activity levels but not body composition or blood pressure in early adulthood

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Special Interest Group: G. Children and families (SIG)

Purpose. Theories and models describing development of sport participation suggest that multi-sport participation is associated with long-term health benefits, whereas single-sport participation is not. While there is well-developed literature on elite athletes, evidence on adherence to sport participation in the general population is lacking. Further, whether individuals in the general population have trajectories similar to those of athletes is unknown. The objectives of this analysis were: (i) to identify naturally occurring sport participation trajectories during adolescence, (ii) assess similarity with those described in sport participation models among athletes, and (iii) examine longitudinal associations between trajectories identified and health outcomes in young adults in the general population.

Methods. We used data from 655 participants in the Nicotine Dependence in Teens study (51% of the 1294 recruited). Participants self-reported sport involvement four times per year from age 12 to 17 years. At age 24, level of physical activity was assessed using the IPAQ and height, weight, waist circumference, skinfold thickness and blood pressure were measured objectively. We used group-based trajectory modeling to identify trajectories of the number of sports youth take part in, as a function of age. Associations between adolescent sport participation trajectories and physical activity, anthropometric and blood pressure outcomes in early adulthood were estimated in multivariable linear regression models.

Results. We identified four distinct sport participation trajectories during adolescence: non-participants (n=149, 22%), dropouts (n=133, 21%), single sport participants (n=247, 37%), and multi-sport participants (n=126, 20%). Single- and multi-sport participation during adolescence were associated with higher levels of physical activity in young adulthood (β (95 % confidence interval) = 0.21 (0.01-0.42); 0.30 (0.04-0.55), respectively). There was no association between sport participation trajectories during adolescence and anthropometry or blood pressure in early adulthood.

Conclusions. In contrast to theories and models describing the development of sport participation suggesting that early multi-sport participation is associated with higher physical activity levels in adulthood, we found that both single- and multi-sport participation trajectories are associated with physical activity levels in young adulthood. However, sport participation trajectories in adolescence did not appear to translate into better anthropometric or blood pressure measures.

Adolescent's weight status and mental wellbeing: the role of body image

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Special Interest Group: G. Children and families (SIG)

Introduction: Adolescent underweight, overweight, and obesity are linked to mental health. However, little is known about whether body mass index (BMI) operates through the pathway of one's weight perception in order to influence mental wellbeing. This study aims to explore associations between young people's weight status, body image, and mental wellbeing in an international sample, which is of interest for policymakers and others working in the field of public health.

Methods: The study was based on cross-sectional data from 15-year-old adolescents from 46 countries (n = 76998), participating in the 2017/2018 Health Behaviour in School-aged Children survey. Mixed regression models were used to assess associations between weight status and mental wellbeing. The mediating effect of body image was tested in a second model. Country and school class were considered as random variables in models 1 and 2. The relationship between gender, socioeconomic status, country, and mental wellbeing, as well as their interactions with weight status, were also included in the analysis.

Results: Living with normal BMI was associated with higher life satisfaction and lower levels of subjective health complaints, than did living with underweight, overweight, and obesity. Positive body image (perceiving own body as "about the right size") was associated with higher levels of mental wellbeing almost regardless of weight status. Around one-third of the adolescents classified with normal BMI, reported negative body image (perceiving own body as "too thin" or "too fat"). Country, SES, and gender influenced both, weight status and mental wellbeing. Further, country and gender differences in the association between weight status and mental wellbeing can be linked to body image.

Conclusions: While both weight status and body image were related to adolescents' life satisfaction and subjective health complaints, body image was more strongly associated with these indicators of mental wellbeing. The findings should be considered when informing policies and public health programs addressing adolescents, as promoting positive body image could potentially increase adolescents' mental wellbeing. Cross-national variation as well as gender differences in the influence of body image should be viewed in light of socio-cultural differences related to body norms.

An ActivPAL cycling algorithm: validity and relevance

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Special Interest Group: J. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

Purpose: Regular physical activity has been recognized as an essential part of a healthy lifestyle. Using algorithms, current thigh-worn activity monitors are able to distinguish sitting, standing and stepping activities. Identification of cycling is an important next step, as it is part of both leisure-time physical activity and active travel. A newly developed algorithm for activPAL enables identification of cycling as a separate activity category. The validity and relevance of this algorithm was studied.

Methods: 10 adults wore the ActivPAL3 on their thigh for seven days continuously and registered cycling activities in a diary during the same seven days. We compared the number and duration of cycling events distinguished by the activPAL algorithm with the cycling events reported in the diaries. The relevance of using the algorithm was verified by calculating the time spent cycling as a ratio of the total active time. The estimated energy used for cycling was compared with the total estimated energy expenditure.

Results: The participants reported a total of 158 cycling events, with a median total duration per participant of 192.5 minutes/week (IQR: 73.8-263.8). The duration of reported cycling events ranged between 1 and 94 minutes; per participant the number of cycling events varied between 1 and 32 times. ActivPal was able to recognize 98.5% of the reported cycling events. Two of the reported cycling events were not identified by ActivPAL: a recumbent cycling event and a one-minute cycling event. Two active events of ice speed skating and field hockey were falsely classified as cycling. The percentage of energy spent cycling of the total energy expenditure ranged between 8.1 and 61.4% per participant. Estimated energy expenditure was 28% higher if cycling was distinguished from stepping time.

Conclusions: This study showed that the algorithm is sensitive to distinguish cycling from other physical activity events in thigh-worn accelerometry measurements by ActivPAL. In the population studied, cycling made up a significant part of daily activity and distinguishing cycling from general activity classifications significantly affected estimated energy expenditure. Through more specified estimates of physical activity, the utilization of this algorithm can enhance our understanding of physical activity behavior.

Antenatal care for gestational weight gain: women's receipt and acceptability of care

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Special Interest Group: E. Implementation and scalability (SIG)

Purpose: Internationally, up to 70% of pregnant women gain weight outside of their gestational weight gain recommendations. The assessment and management of gestational weight gain as part of routine antenatal care is recommended in many countries to improve pregnancy and birth outcomes, and maternal and child chronic disease risk. Little is known about the conduct and acceptability of such practices in antenatal care. This study reports the: i) proportion of pregnant women assessed and offered support to manage gestational weight gain in line with the Australian Pregnancy Care guidelines, ii) characteristics of pregnant women and antenatal services associated with care receipt, and iii) women's acceptability of recommended care.

Methods: Cross sectional telephone surveys with postpartum women who had recently attended public antenatal services were undertaken in one health district in Australia. The surveys were reviewed to ensure Aboriginal cultural safety and inclusion. Women self-reported demographic characteristics, gestational weight gain during pregnancy, and receipt and acceptability of guideline recommended care of care were examined. Characteristics associated with receipt of recommended care were analysed using multiple logistic regression.

Results/findings: A total of 514 women completed the survey. Seventy percent of women gained weight below or above the gestational weight gain guidelines. Only 7% of women received recommended gestational weight gain care. Women who were in their first pregnancy, identified as Aboriginal, had a higher pre-pregnancy body mass index, and not residing in an advantaged area were more likely to receive recommended care. Most Aboriginal and non-Aboriginal women agreed that recommended care for gestational weight gain (92% and 93%) should be provided as routine antenatal care.

Conclusions: Most women did not receive antenatal care for gestational weight gain as recommended by the Australian Pregnancy Care Guidelines, despite high acceptability of receiving such care. There is a need for service-wide practice change to increase care to address gestational weight gain in pregnancy.

Are caregivers' emotional feeding and children's emotional eating associated with children's consumption of ultra-processed foods ?

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Special Interest Group: G. Children and families (SIG)

Purpose: High consumption of ultra-processed food (UPF) increases the risks of non-communicable diseases, obesity, depression and all-cause mortality in adulthood, and the risk of caries in early childhood. Limited evidence about factors influencing children's consumption of UPF existed. This study was conducted to evaluate the association between caregivers' emotional feeding, children's emotional eating and the consumption of UPF among children under three years of age.

Methods: A cross-sectional self-administered survey was conducted in rural areas of China among 409 caregivers whose children were 6-36 months. Parents' Feeding Practices Scale for Infant and Young Child and Children's Eating Behavior Questionnaire were used to assess caregivers' emotional feeding and children's emotional eating, respectively. Children's consumption of UPF was assessed by a Food Frequency Questionnaire. Logistic regression analyses were performed to evaluate the associations between caregiver's emotional feeding, children's emotional eating and their consumption of UPF, after controlling for potential confounders.

Results: In total, 98% children consumed UPF. The highest prevalence of UPF consumed was pastries (63.5%), followed by solid or semi solid dairy products (58.8%), infant formula (56.7%), reconstituted meat products (56.4%), and then confectionery (38.2%), sweet or savory packaged snacks (35.8%), sugar-sweetened beverage (20.0%), infant rice flour (15.6%). There existed differences in the consumption of UPF among children aged 6-11 months, 12-24 months, and 25-36 months. Logistic regression showed that among children aged 12-24 months, caregivers' emotional feeding was associated with higher odds of children's consumption of reconstituted meat products (OR 5.453, 95%CI 2.081, 14.292) and sweet/savory packaged snacks (OR 5.532, 95%CI 1.615, 18.948). Children's emotional overeating was marginally associated with higher odds of consumption of sweet/savory packaged snacks (OR 2.404, 95%CI 0.994, 5.817) and pastries (OR 2.837, 95%CI 1.231, 6.539). Among children aged 25-36 months, children's emotional undereating was associated with higher odds of reconstituted meat products consumption (OR 1.661, 95%CI 1.151, 2.398).

Conclusions: Caregivers' emotional feeding, children's overeating and undereating were associated with children's consumption of unhealthy UPF, including reconstituted meat products, sweet/savory packaged snacks, and pastries. To improve children's diet quality, caregivers' feeding practices and cultivating children's good eating habits should be educated.

Are health behaviours associated with academic performance and mental health among tertiary education students? A systematic review of cohort studies

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Special Interest Group: L. Other

Purpose: Universities are identified as a key setting for health by the World Health Organisation. The academic achievement and health of university students predict future career success and health outcomes. The presented systematic review aimed to describe associations between health behaviours (dietary intake, physical activity, sedentary behaviour, alcohol intake, sleep, smoking, drug use) and academic performance and mental health outcomes among tertiary education students, using evidence from cohort studies.

Methods: Six electronic databases were searched for cohort studies published up to July 2020 that explored the association between one or more health behaviours with academic performance and/or mental health outcomes among tertiary education students. Data were analysed by vote counting, whereby if 0-33% of studies reported a significant association, it was classified as “no association”; if 34-59% reported a significant association, or if fewer than four studies reported on that outcome, it was classified as “inconsistent” and “uncertain”, respectively; and if 60% or more of studies reported a significant association, it was classified as “positive” or “negative” based on the direction.

Results: The search identified 8,457 articles. From this, 55 studies were included with 34 and 26 studies having academic performance and mental health outcomes respectively, including five studies with both. Eighty-percent of studies (n=44) were published in the last decade, and half were from the USA (n=27, 49%). The most commonly measured health behaviour was sleep (n=18 studies, 53%) for the association with academic performance outcomes. Twelve studies (67%) reported significant associations and the association was graded as “negative”, i.e. poor sleep was consistently associated with poorer academic performance. The most commonly measured health behaviour was alcohol intake (n=12 studies, 46%) for the association with mental health outcomes. Eight studies (67%) reported significant associations and the association was graded as “negative”, i.e. higher or more frequent alcohol intake was consistently associated with poorer mental health.

Conclusions: Knowledge of the associations between health behaviours with academic performance and mental health outcomes among tertiary education students can support advocacy for greater investment in health promotion services for students, and inform the development of targeted services.

Are Pediatric Care Providers Meeting AAP guidelines for Discussing Infant Feeding and Sleep Recommendations?

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Special Interest Group: G. Children and families (SIG)

Purpose: To determine whether pediatric healthcare providers are meeting American Academy of Pediatrics (AAP) guidelines regarding infant feeding and sleep recommendations.

Methods: A 10-minute online survey assessed infant feeding and sleep recommendations providers discuss with caregivers. The survey was sent to the AAP Rhode Island Chapter and Rhode Island State Nurses Association. Responses were coded as “meeting vs. not meeting” guidelines.

Results: A total of 28 medical doctors (MDs) and 31 physician assistants (PAs), registered nurses (RNs), and nurse practitioners (NPs) completed the survey. Most were non-Hispanic white (95.7%), and a third were between 31-40 years of age (29.8%). Almost all MDs discussed the importance of exclusive breastfeeding for 6 months (100%), how to identify developmental readiness for solid foods (100%), the importance of introducing a variety of foods (100%), the importance of responsive feeding practices (96.4%), vitamin D supplementation for exclusively breastfed (EBF) infants (96.4%), and discouraging bed-sharing (96.3%). The majority of MDs also discussed the importance of continued breastfeeding for 12 months (74.1%), the importance of introducing different types of textures (85.7%), and the importance of self-feeding (85.7%). Less than half did not discuss introducing solids between 6-7 months (21.4%), transitioning to cup drinking at six months (45.8%), and avoiding introducing juices and sugar-sweetened beverages before 12 months (32.1%).

PAs and nursing staff reported similar compliance for discussing the importance of exclusive breastfeeding for six months (96.8%) and the importance of responsive feeding practices (96.7%). Although a greater percentage of PAs and nurses discussed the importance of continued breastfeeding for 12 months (96.8%), fewer met the guidelines for how to identify developmental readiness for solid foods (51.6%), the importance of introducing a variety of foods (41.9%), vitamin D supplementation for EBF infants (29.0%), the importance of introducing different types of textures (40.0%), and the importance of self-feeding (35.5%).

Conclusions: Most pediatric healthcare providers meet AAP guidelines for discussing breastfeeding and responsive feeding practices, but there is room for improvement regarding other relevant feeding and sleeping recommendations. Future interventions to support provider awareness of and communication about these practices may be warranted to improve infant health outcomes.

Assessing active mobility in urban environments: Real-time measurement of walking, momentary affect and environmental factors using triggered EMA

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Special Interest Group: H. Policies and environments (SIG)

Purpose: Living in urban areas is associated with health risks (e.g. inactivity and social isolation). Preliminary studies show that urban structures expose residents to varying risks in this respect, leading to recommendations on health enhancing urban design. However, former findings revealed inconsistencies regarding the association between walkability, active mobility, and health. Furthermore, the influence of social and physical environmental factors on momentary affect in everyday life are almost unexplored. To address this gap, we developed an innovative triggered EMA to capture real-time data on psychological as well as social and physical environmental factors whenever an individual is walking outside home. In a first step we explored feasibility of this walking-trigger.

Methods: The walking-trigger combines movement acceleration and positioning by mobile phone positioning services (GPS and transmission tower) to identify active mobility. The trigger started an e-diary whenever movement acceleration exceeds a certain threshold and participant's locations were identified as outside the home. Participants received e-diaries for ten consecutive days (6am to 10pm) on three different occasions: 1) every morning, 2) randomly during four time-blocks throughout the day, and 3) whenever the trigger identified active mobility. Activity data are integrated into a mapping software to add information on origins and destinations as well as additional information on facilities and amenities along the pathway.

Results: Data of 79 individuals (48% female, Mage = 40.67, SDage = 14.56) could be analyzed. Two datasets were missing due to technical problems or non-compliance. Participants received on average 13 EMA prompts per day, of which they completed 64%. Validation analyses showed that in 71% of all triggered assessments individuals were walking outside their home at the time. Furthermore, triggered EMA revealed substantial variability in social and physical environment.

Conclusions: This triggered EMA has been successful to collect data in everyday life situations in different social and physical environments. The high compliance rate supports the robustness of a method that helps to analyze the moderating effects of movement through social and physical environments on mental health. Such a design could help to learn more about health effects of specific locational context factors during everyday life.

Association between undefined complaints and lifestyle habits in female university students: a cross-sectional study under self-quarantine due to COVID-19

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Special Interest Group: L. Other

Purpose: The aim of this study was to examine the relationship between the cumulative number of undefined complaints and the lifestyle habits of female university students, whose daily activities were restricted and were forced to receive online classes due to the COVID-19 pandemic.

Methods: Three hundred and forty-nine female university students voluntarily participated in this study, which was a baseline assessment of an interventional study of a project for exercise videos distributed online. The subjects filled out a web questionnaire which asked about status of breakfast intake, sleep time on days with and without classes, sitting time per day, exercise frequency per week in the past month, as well as 21 complaints. Subjects were divided into tertiles based on a distribution of the cumulative number of symptoms. Following a trend test to extract variables which associated the number of symptoms, odds ratios of each lifestyle behavior in each tertile were calculated using a logistic regression model.

Results: Significant trends were observed between the number of complaints and the sleep and physical activity-related variables. Also, odds ratios in the sleep time on the days with classes and the frequency of exercise were significantly lower in the middle tertile compared with the bottom tertile. Further, in the top tertile, a significantly lower odds ratio was found in the sleep time on the days with classes, on the other hand, the odds ratio was significantly higher in the sleep time on the days without classes. Similarly, the odds ratio for the sitting time was also significantly higher in the top tertile.

Conclusions: Our findings suggested that the higher the cumulative number of self-reported complaints, the stronger the tendency for lack of sleep on class days and excessive sleep on non-class days, as well as a more serious physical inactivity. It is a well-known fact that the undefined complaints in females are affected by female hormones; however, we concluded that lifestyle problems, especially in sleep and physical activity, might be also able to explain the cumulative number of complaints in female university students, who were under the self-quarantine due to the spread of COVID-19.

Associations between environmental factors and childhood eating behaviours in 5-year-old children. Findings from the ROLO longitudinal birth cohort study

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Special Interest Group: G. Children and families (SIG)

Purpose: A child's food choice and exposure will be influenced by their environment. The extent to which maternal socio-economic status (SES), maternal education and childcare exposure are associated with childhood eating behaviours has not yet been fully established. We sought to determine what associations exist between these environmental factors with both food approach and food avoidant eating behaviours.

Methods: Data was collected as part of the ROLO (randomised control trial of low glycemic index diet) longitudinal birth cohort study. At the 5 year follow up, eating behaviours were measured using the Children's Eating Behavior Questionnaire (CEBQ). SES was determined using maternal education level and neighborhood deprivation score. Lifestyle questionnaires were used to measure childcare exposure. Multiple linear regression analysis was used to determine associations between maternal SES, maternal education level, childcare exposure and children's eating behaviours.

Results: In the current analysis, 401 mother and child pairs were included. Of these, 23% of the children had a BMI in the overweight or obese range. 51% of mothers were considered in the highest SES group. A significant difference was observed between the highest SES group and the lowest SES group for maternal BMI and maternal age at delivery ($p=0.003$, and $p<0.001$ respectively). Children from the lowest maternal SES category had significantly lower mean 'Food fussiness' scores compared to those in the highest category ($B=-5.52$, 95% CI=-5.00, -0.03). Of the food approach eating styles, children from the lower SES group had higher mean scores for 'Desire to drink' than those from the highest SES group. Childcare was availed of by 89% of children, with median childcare exposure of 4.1 years. Increased childcare exposure was positively associated with food responsiveness ($B=0.451$, 95%CI 0.032,0.870) and emotional overeating ($B=0.272$, 95%CI=0.061,0.482).

Conclusions: Childhood eating behaviours were associated with maternal SES, with this more evident in food avoidant rather than food approach eating styles. Additionally, we found that longer exposure to childcare was associated with food approach eating behaviours thus indicating the importance of instilling healthy eating behaviours both in the home and outside the home settings, particularly the longer the child is exposed to childcare.

Associations between health-related quality of life with physical fitness and mode of commuting in Spanish school-aged children

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Special Interest Group: G. Children and families (SIG)

Purpose: Health Related Quality of Life (HRQoL) refers to the subjective perception of well-being of the individual in different physical, mental and social dimensions of health. An important factor contributing to a good perception of HRQoL is the physical fitness (PF) implies various benefits. Among the possible other factors that could influence the HRQoL of young people, the daily physical activity (PA) levels could have a significant impact. For instance, active commuting to/from school (ACS) has been considered a potential alternative for accumulating daily PA in youth. There is little information in the literature about the relationship between HRQoL and ACS. The aims of this study were (1) to analyse the associations between HRQoL, PF (i.e., cardiorespiratory fitness, muscular strength, and speed-agility) in Spanish children, and separately by gender, and (2) to analyse the difference in cardiorespiratory fitness level by mode of commuting to and from school by gender.

Methods: The data of this study were obtained as part of the PREVIENE Project (Promoting Healthy Lifestyles for the School Environment). We conducted a cross-sectional analysis including 415 children aged 8.47 ± 0.36 years old from 14 public schools in Granada, Spain. The HRQoL was assessed using the valid and reliable KINDL-R questionnaire distributed into 6 dimensions (physical wellbeing, emotional wellbeing, self-esteem, family, friends, and school), and children's physical fitness was assessed by the ALPHA fitness test battery (Cardiorespiratory fitness, muscular strength, and speed-agility). Commuting to/from school was assessed using the valid, reliable and feasible "Mode and Frequency of Commuting To and From School Questionnaire".

Results: Cardiorespiratory fitness was positively correlated with all dimensions of HRQoL in boys, whereas higher muscular strength (standing long jump test) was positively correlated with the emotional well-being dimension only in girls (all $p < 0.005$).

Conclusions: HRQoL was positively correlated with cardiorespiratory fitness in boys (all dimensions), while muscular strength (standing long jump) was positively correlated with the emotional well-being dimension only in girls. The boys

who actively commute to school were related to emotional wellbeing, family and total score of the KINDL-R. Improving cardiorespiratory fitness might be especially useful to improve HRQoL in children.

Associations of accelerometer-based sedentary bouts with indicators of obesity among German adults – results from a pooled, cross-sectional study

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Special Interest Group: K. Disease prevention and management

Purpose: Long periods of uninterrupted sitting (i.e., sedentary bouts) and their relationship with adverse health outcomes have moved into focus of public health recommendations. However, evidence on associations between indicators of obesity and sedentary bouts is scarce. The aim of this study was to investigate associations of waist circumference (WC) and body mass index (BMI) with the daily number of sedentary bouts.

Methods: In this cross-sectional study, data were collected from three studies among adults from the general population that took place in the area of Greifswald, Northern Germany, between 2012 and 2018. Four hundred sixty 40–75-year-old adults wore tri-axial accelerometers on the hip for seven consecutive days. A wear time of ≥ 10 hours on ≥ 4 days was required for analyses. WC (cm) and BMI (kg m^{-2}) were measured in a standardized way. Separate multiple linear regression analyses were used to investigate associations of sedentary bouts (10-to-30 min and >30 min) with WC and BMI including the covariates sex, age, school education, employment, smoking, season, original study, moderate-to-vigorous physical activity, light physical activity, and accelerometer wear time.

Results: Participants (66% females) were on average 57.1 (SD 8.5) years old and 36% had school education >10 years. Mean WC was 91.1 cm (SD 12.3) and mean BMI was 26.9 kg m^{-2} (SD 3.8). The mean number of sedentary bouts per day was 16.5 (SD 4.1) for 10-to-30 min bouts and 3.2 (SD 1.8) for >30 min bouts. The number of >30 min bouts per day was positively associated with WC ($b = 0.776$; $p = 0.038$), but not with BMI ($b = 0.243$; $p = 0.074$). Associations of sedentary 10-to-30 min bouts with WC and BMI were not significant ($p = 0.732$ and $p = 0.960$, respectively).

Conclusions: The findings provide evidence on the deleterious association of sedentary bouts that last longer than 30 min with waist circumference. Sedentary periods between 10 and 30 min were not related to any of the obesity markers. Our findings may contribute to a growing body of literature that is needed to develop public health recommendations on interruptions of prolonged sedentary time.

Associations of body composition and physical fitness with gestational diabetes and cardiovascular health in pregnancy: Results from the Healthy Moms trial

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Special Interest Group: K. Disease prevention and management

Purpose: There is a great lack of data examining associations of body composition and physical fitness with gestational diabetes and cardiovascular health in pregnancy. The aim of this study was therefore to examine associations of body composition (fat mass index, % fat mass, fat-free mass index, body mass index) and physical fitness (cardiorespiratory fitness and handgrip strength) with gestational diabetes and cardiovascular health in early pregnancy.

Methods: This cross-sectional study utilized baseline data (n=303) collected in early pregnancy from the HealthyMoms trial. Body composition was measured using air-displacement plethysmography, cardiorespiratory fitness was assessed by means of the 6-minute walk test and handgrip strength using a dynamometer. Logistic regression was used to estimate odds ratios (ORs) for gestational diabetes as well as high (defined as 1 SD above the mean) blood pressure, homeostatic model assessment for insulin resistance (HOMA-IR) and metabolic syndrome score (MetS score) per SD increase in body composition and fitness variables.

Results/findings: Fat mass index, % fat mass and body mass index were all strongly associated with gestational diabetes (ORs: 1.72-2.14, $P < 0.001$), HOMA-IR (ORs: 3.01-3.80, $P < 0.001$), blood pressure (ORs: 1.82-2.05, $P < 0.001$) and MetS score (ORs: 3.29-3.71, $P < 0.001$). Associations with fat-free mass index were considerably weaker (ORs: 1.26-1.82, $P = 0.001-0.15$) and were strongly attenuated after adjustments for fat mass index (ORs: 0.88-1.54, $P = 0.039-0.68$). Finally, greater cardiorespiratory fitness was associated with lower risk of high HOMA-IR and MetS score (ORs: 0.57-0.63, $P \leq 0.004$) although these associations were attenuated when accounting for fat mass index (ORs: 1.08-1.11, $P \geq 0.61$).

Conclusions: Accurately measured fat mass index or % fat mass were strongly associated with gestational diabetes risk and markers of cardiovascular health although associations were not stronger than the corresponding ones for body mass index. Fat-free mass index had only weak associations with gestational diabetes and cardiovascular health which support that the focus during clinical care would be on excess fat mass and not fat-free mass.

Attitude towards parents engaging children in traditional physical activity opportunities during the COVID-19 pandemic

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Special Interest Group: G. Children and families (SIG)

Purpose: A collateral consequence of the novel coronavirus (COVID-19) pandemic has been the alarming increase in sedentary behaviours, especially among children. As many countries begin to alleviate social/physical distancing regulations and proceed towards normalcy, children's traditional physical activity (PA) opportunities will be offered. A predicted barrier to returning to PA in public settings is the stigma and fear associated with contracting COVID-19. The objective of this exploratory study was to investigate current societal perspectives related to engaging children in traditional PA opportunities.

Methods: A cross-sectional survey was administered online in Canada throughout January 2021. Canadian residents, ≥ 18 years of age, who could understand English or French were eligible to participate. Survey items required participants to indicate their level of agreement with statements that were designed to understand their attitude towards parents engaging their children in physical activities (playgrounds, individual or group sports, community programs). There were five scale items developed by referring to the Theory of Reasoned Action. Scale items were assessed prior to dissemination using cognitive interviewing techniques. As a part of demographics, participants indicated if they were parents or not. Data were evaluated descriptively. A Chi-Square analysis was performed to compare the selection of responses between parents and non-parents.

Results: 459 participants completed the survey, of which 160 were parents, 270 were non-parents and 29 chose not to specify parental status. Most participants indicated responses that were neutral or accepting engagement in traditional individual sports (75.7%) and for using playground or community equipment (74.0%). However, half of participants disagreed with encouraging the participation of group sports (51.3%) or sporting competitions (59.0%). When comparing responses between parents and non-parents, more parents expressed strong disagreement with preventing playground use (22.5%) than non-parents (11.8%, $p=0.04$).

Conclusions: Overall, participants appear to be comfortable returning children to individual structured sporting activities; however, there is public hesitation for group-based activities. Parents disagree more with restricting playground use compared to non-parents. Public health authorities should plan effective safety strategies to increase community comfort levels when resuming the use of free playgrounds and group sports.

Barriers and Motivators to Physical Activity Prior to Starting a Walking Program

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Special Interest Group: E. Implementation and scalability (SIG)

Purpose: Most adults fail to meet physical activity (PA) guidelines. A broader understanding of barriers, reinforcements, and motivators of PA is important for community-based program development.

Methods: Four years of baseline, data from a community-based walking program were analyzed (n=1491). Barriers to PA were assessed with seven dichotomous items assessing weather, health, and time-related barriers. Reinforcements to PA were assessed with four dichotomous items assessing weather and health related reinforcements. Participants were also asked to provide open-ended responses to barriers and reinforcements to PA. Self-reported physical activity and walking was assessed using the International Physical Activity Questionnaire Short-Form.

Descriptive statistics summarized participant characteristics, barriers, reinforcements, and PA. Open-ended responses were analyzed using thematic analysis. Chi-square and two-sample t-tests were used to assess differences between the reported barriers, reinforcements, and motivators and PA-level.

Results: On average, participants were white (96%), middle age (52±13 years old) females (92%) with 30% of participants classified as low PA, 35% as moderate PA, and 35% as high PA.

Participants classified as moderate or high PA were more likely to be motivated by health reasons including weight maintenance. Inactive participants were more likely to report weather and time related barriers. Inactive participants were also more likely to be overweight or obese. There was no significant difference between PA category and other demographics.

Open-ended responses (n=141) identified additional barriers (listed in frequency) of lack of motivation (n=37), joint issues (n=29), being tired (n=24), safety or lack of environmental supports (n=17), family or work demands (n=15), would rather do something else (n=10), or do not have a walking partner (n=9). Additional motivators (n=282) were identified of stress relief and mental health (n=82), social time (n=70), dog care (n=41), other health benefits (n=38), connect with nature (n=19), enjoyment (14), occupation (n=11), environmental and community supports (n=6)

Conclusions: Findings highlight the importance of understanding participant barriers and motivators for PA before starting a program. Future research will examine how reported barriers and motivators are related to program completion and adherence. Tailoring community-based programs to address specific barriers and motivators may enable more participants to effectively change and maintain PA.

Barriers to active commuting by bicycle in university students in Santiago, Chile

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Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: To describe the prevalence, patterns and barriers of active commuting by bicycle in university students in Santiago, Chile.

Methods: We conducted a cross-sectional study that included a non-probabilistic sample of 534 university students in Chile (171 men, 363 women), with an average age of 26.5 ± 7.7 years. Participants completed a questionnaire about barriers to active commuting by bicycle. Means, standard deviations, and percentages were used for the descriptive analysis of commuting mode and perceived barriers for using the bicycle. Data were compared by sex using Chi-square or Student t-tests as required.

Results: In total, only 2.3% reported using the bicycle as the primary means of transport to go (4.1% men vs. 1.4% women, $p=0.053$) and 2.5% (5.3% men vs. 1.1% women, $p=0.006$) from the university. Approximately 50% of participants reported using the public bus to commute to (51.8%) and from university (50.9%). Transportation by public bus was more common in women than men when going to (57.5% vs. 38.9%, $p < 0.001$) and from the university (55.9% vs. 40.4%, $p < 0.001$). Men and women reported different barriers to cycling. The most common barrier for cycling in men was "It requires too much physical effort" (60.4%), while in women, it was "I need a car or motorcycle to work" (63.5%). Some barriers differed by sex such as "I need a car or motorcycle to work" (50% men vs 63.5% women, $p = 0.005$), "There are no places to leave the bicycle" (58.4% men vs 46.2% women, $p = 0.003$) and "It requires physical effort" (60.4% men vs 51.5% women, $p = 0.047$).

Conclusions: Active commuting by bicycle in university students in Santiago, Chile is low compared with national data. The barriers for cycling to and from the university differed by sex, suggesting that strategies for promoting active commuting should include these perspectives into their actions.

Barriers to healthy lifestyle behaviors among adolescent girls of disadvantaged backgrounds in Ireland: a qualitative study of teachers' perspectives.

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Special Interest Group: I. Socio-economic inequalities (SIG)

Purpose: Adolescence is a sensitive period regarding the development of long-lasting health-related attitudes and behaviors. Adolescent females are particularly sensitive to overweight and obesity, especially those from disadvantaged backgrounds. However, little research has examined the factors that influence their engagement in these behaviors using a qualitative approach. Therefore, the current study aimed to develop an understanding of the factors which influence health-related behaviors of disadvantaged adolescent girls in Ireland from a teachers' perspective.

Methods: Online semi-structured interviews were conducted with teachers (n=9) from post-primary disadvantaged schools in Dublin (Ireland). Data were recorded, transcribed verbatim and independently coded by two researchers. Themes were examined using an inductive thematic analytic approach and fitted to the Socio-Ecological Model (SEM).

Results/findings: Nine themes were identified and mapped within the SEM levels: 1) individual: lack of interest and knowledge, lack of self-confidence, the dual role of modern technology; 2) interpersonal: behaviors of significant others, need for good role models; 3) school and community: availability of convenience foods, inadequate existing approaches and initiatives, lack of resources to promote a healthy lifestyle; and 4) societal: living difficulties at home and in the community.

Conclusions: Findings presented a range of factors that should be addressed to promote positive health-related change in disadvantaged adolescent girls, with opportunities for intervening at a range of different levels, from individual-level factors to community-level factors. Among these identified factors, a lack of interest among the girls makes it difficult to harness motivation to engage with health-related content and interventions.

Between and Within Day Variability in Body Fat Percentage in Children and Adults Using the Tanita Bioelectrical Impedance Analysis System

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Special Interest Group: J. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

Bioelectrical Impedance Analysis (BIA) body composition estimates of body composition currently require an overnight fast to minimize factors that influence BIA estimated body composition (e.g., food and liquid intake, timing of day). Requiring measures first thing in the morning limits the use of BIA in studies that employ opportunistic measures of body composition (e.g., at school, at the doctor's office).

Purpose: This study examined the within- and between-day variability of BIA-estimated body composition in a sample of children (5-12 years old) and adults (25-58 years old).

Methods: Participants (20 children and 13 adults) collected BIA estimated body fat percentage (BF%) via the Tanita DC-430U six times per day (fasted at wake, 9am, 11am, 1pm, 5pm, before bed) for 2 full days. Multi-level mixed regressions (observations nested within days; days nested within participants) estimated within-day (i.e., measures on same day compared to fasted) and between-day (i.e., measures at same time on different days) variations in BIA-estimated BF%.

Results: For children, within-day BIA estimated BF% differed from fasted at 9am (0.59, 95%CI=0.34, 0.84), 11am (0.83, 95%CI=0.58, 1.09), 1pm (1.25, 95%CI=1.00, 1.51), 5pm (1.32, 95%CI=1.08, 1.56), and bedtime (1.13, 95%CI=0.89, 1.38), while between days differed at fasted (0.69, 95%CI=0.30, 1.08), 9am (0.47, 95%CI=0.02, 0.92), 11am (0.83, 95%CI=0.34, 1.32), 1pm (1.43, 95%CI=0.95, 1.92), 5pm (1.15, 95%CI=0.72, 1.59), and bed (1.39, 95%CI=1.03, 1.75). For adults, within-day BIA estimated BF% differed from fasted at 9am (2.02, 95%CI=1.55, 2.49), 11am (2.27, 95%CI=1.80, 2.74), 1pm (2.12, 95%CI 1.63, 2.61), 5pm (2.15, 95%CI 1.68, 2.62), and bed (1.26, 95%CI =0.80, 1.73), while between days differed at fasted (0.83, 95%CI=0.49, 1.17), 9am (1.15, 95%CI=0.71, 1.58), 11am (0.74, 95%CI=0.28, 1.19), 1pm (1.38, 95%CI=0.88, 1.88), 5pm (0.98, 95%CI=0.53, 1.43), and bed (1.15, 95%CI=0.82, 1.48).

Conclusions: Variability within and between days was generally smaller for children than adults and in the morning compared with the afternoon. These findings indicate that opportunistic measures of BIA may be more suited for capture in children and in the morning. Future studies should explore the impact dietary intake may have on BIA-produced body composition estimates, which could explain the increased variability as time from fasted is increased.

Bidirectional Relationships among Children's Perceived Competence, Motor Skills, Physical Activity, and Fitness across One School Year

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Special Interest Group: G. Children and families (SIG)

Purpose: Although researchers have investigated relationships among children's motor skills (MS), perceived competence (PC), physical activity (PA) and health-related fitness (HRF), the bidirectional associations among these variables over time remain unexplored. This study was designed to discern the bidirectional relationships among elementary children's MS, PC, PA and HRF over the course of one school year.

Methods: A total of 261 second and third grade children (127 boys; Meanage = 8.27 years) were recruited from two Texas elementary schools. Children's baseline data were assessed in September/October in 2012 (T1), and they underwent identical assessments in April/May in 2013 (T2). In detail, children's motor skills were assessed using product-oriented skill tests (e.g., throw, kick, and jump). PC was assessed via the Pictorial Scale of Perceived Competence and Social Acceptance for Young Children. Their daily minutes spent in moderate-to-vigorous PA (MVPA) was assessed using ActiGraph GT3X+ accelerometers for five days (including 3 weekdays and 2 weekends), and HRF was assessed by the PACER test.

Results: Through a series of cross-lagged modeling tests, we observed that T1 MS significantly predicted T2 MS ($\beta = 0.58$; $p < 0.01$), T2 HRF ($\beta = 0.28$; $p < 0.01$), and T2 MVPA ($\beta = 0.18$; $p < 0.01$), but did not predict PC ($\beta = -0.03$). Children's T1 PC was a positive predictor for T2 MS ($\beta = 0.10$; $p < 0.01$), but not for T2 PC ($\beta = 0.04$), T2 HRF ($\beta = 0.04$) nor T2 MVPA ($\beta = 0.03$). Additionally, T1 MVPA significantly predicted T2 MVPA ($\beta = 0.30$; $p < 0.01$) and T2 PC ($\beta = -0.14$; $p < 0.01$), but not T2 MS ($\beta = 0.05$) nor T2 HRF ($\beta = 0.08$). Lastly, T1 HRF was a predictor for T2 HRF ($\beta = 0.56$; $p < 0.01$) and T2 MS ($\beta = 0.13$; $p < 0.01$), but not for T2 MVPA ($\beta = 0.03$) nor T2 PC ($\beta = -0.07$).

Conclusions: Findings suggested a fully bidirectional relationship between elementary children's MS and HRF. Other bidirectional relationships among the variables were only partially supported. Investigating the mediating role of PC between MVPA and MS/HRF may be further investigated.

Broadening our understanding of 'positive ageing' to include the contribution of built environment, place, and physical mobility: Results of a scoping review

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Special Interest Group: A. Ageing (SIG)

Purpose: Positive ageing represents a multidimensional and holistic approach to viewing older age. Many older adults desire to 'age in place' and remain physically active and mobile within their local environments. As the mobility radius of older adults decreases with age and frailty, the importance of supportive and accessible built environment features is intensified. Yet, the vast positive ageing literature has rarely explored the contribution of the built environment, place, and physical mobility. Guided by Arksey and O'Malley's scoping review framework, we bring together heterogeneous terminology and understandings to explore positive ageing among community-dwelling older adults in relation to built environment, place, and mobility.

Methods: This research builds on an earlier review which developed a multidimensional understanding of positive ageing. We conducted systematic searches of six electronic databases (CINAHL, Embase, Web of Science Core Collection, Medline, Scopus, PsycINFO) and manual searches of studies included in seven relevant reviews, yielding 6,340 results. Studies meeting general (Study type: English language, peer-reviewed primary study; Participants/Context: community-dwelling older adults (≥65 years), Concept: positive ageing) and specific criteria (exploring built environment, place, and/or physical mobility) were eligible for inclusion. No publication period limits were applied. Methodological quality was assessed using the Mixed Methods Appraisal Tool (five methodological criteria assessed across five study types). Study characteristics and findings were extracted. Data will be analysed following the six-step reflexive thematic analysis approach of Braun and Clark (2006).

Results: Full text screening was completed with 896 articles. Ten articles (seven qualitative; three quantitative) met inclusion criteria and explored built environment (n=4), place (n=5), and/or physical mobility (n=6). Various cultural perspectives were considered across nine countries in Europe (5/10 articles), North America (3/10), Oceania, and Asia. Methodological quality ranged from moderate to high. Common themes highlighting how built environment, place, and physical mobility have been considered in positive ageing literature and their contribution to positive ageing will be discussed.

Conclusions: Findings will offer insight into how older adults interact with their local environments in relation to positive ageing. This knowledge can inform initiatives to create enriching environments to support positive ageing in place.

Bump2Baby and Me Protocol: A randomised controlled trial of maternal mHealth coaching support for improved gestational weight gain and postnatal outcomes

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Special Interest Group: D. e- & mHealth (SIG)

Purpose: Gestational diabetes (GDM) affects up to 18% of pregnancies and also increases both the woman's and child's risk of developing non-communicable diseases such as type 2 diabetes. The IMPACT DIABETES B2B project has been designed to demonstrate the real-world implementation of an evidence-based, effective system of care for prevention of diabetes, overweight, and obesity across antenatal settings. Bump2Baby and Me is the multicentre randomised controlled trial central to the project that aims to investigate a mHealth coaching program for women who are at high risk of developing GDM.

Methods: 800 women will be recruited in early pregnancy from 4 clinical sites within Ireland, UK, Spain, and Australia. Women will be screened for eligibility using the validated Monash GDM screening tool. Participants will be enrolled at approximately 12 weeks' gestation and randomised on a 1:1 basis into the intervention or usual care arm. The intervention group will receive mHealth coaching via a smartphone application, which will use a mixture of synchronous and asynchronous video and text messaging and allow for personalised support and goal setting with a health coach. The usual care arm of the study will receive standard information as part of usual antenatal care.

Results: The Bump2Baby and Me study will assess the effectiveness and cost-efficiency of the low-cost health coaching lifestyle behaviour change app on weight and health outcomes for both mother and child through pregnancy and the first year following birth. The primary outcome will be change in maternal weight at 12 months postpartum. Secondary maternal and infant health outcomes will include development of GDM, weight management in pregnancy, diet, physical activity, sleep, and infant health and growth patterns.

Conclusions: The Bump2Baby and Me intervention proposes to bridge the health service gap using a low-resource, precision medicine, evidence-based intervention, which will take a concurrent mixed-methods implementation research approach. It is anticipated that this study will contribute to early prevention of maternal and child diabetes, overweight, obesity, and other non-communicable diseases.

Changes in physical activity and sedentary behavior during the COVID-19 stay-at-home orders: Associations with psychological outcomes among mothers

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Special Interest Group: K. Disease prevention and management

Purpose: Stay-at-home orders designed to curb the coronavirus disease 2019 (COVID-19) pandemic have created unprecedented circumstances for families. In particular, mothers might be at increased risk for lower engagement in health behaviors due to caregiving demands, which may in turn result in poor mental health outcomes. The purpose of this study is to evaluate the associations of perceived changes in moderate-vigorous physical activity (MVPA) and sedentary behavior (SB) with psychological outcomes (stress, affect, and anxiety) among mothers during stay-at-home orders.

Methods: Between May-August 2020, 309 mothers (aged 37.6±1.5 years; 75% White) with children (aged 0-20 years) at home, who were enrolled in the Lifetime Experiences And Pregnancy (LEAP) study -a subset of the longitudinal Project EAT cohort-, completed an online survey of perceived changes in MVPA and SB. This survey also included validated measures of stress (Perceived Stress Scale [PSS]), affect (Positive and Negative Affect Schedule [PANAS]), and anxiety (Generalized Anxiety Disorder Assessment [GAD-7]). Adjusted linear regressions evaluated the associations of perceived change in MVPA and SB with stress, affect, and anxiety.

Results: For MVPA, 39% of women reported becoming less active, 38% maintaining similar activity levels, and 23% becoming more active during stay-at-home orders. For SB, 63% reported engaging in more sedentary activities, 27% maintaining a similar sedentary lifestyle, and 11% becoming less sedentary. Adjusted regression results revealed that women engaged in less MVPA during the stay-at-home orders reported higher perceived stress, negative affect, and anxiety and lower positive affect relative to those who reported engaging in similar or higher levels of MVPA. Results also revealed that women who engaged in more sedentary activities reported higher stress and negative affect and lower positive affect than those who reported engaging in a similar sedentary lifestyle.

Conclusions: During stay-at-home orders, larger proportions of women reported being less physically active and more engaged in SB, which were associated with poorer mental health indicators. Given the ongoing challenges with the COVID-19 pandemic, researchers and clinicians play a pivotal role in finding new ways to facilitate women's engagement in health-promoting behaviors while reducing the risks of COVID-19.

Changes in Physical Activity and Self-Reported Cognitive Function among Cancer Survivors During the COVID-19 Pandemic

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Special Interest Group: C. Cancer prevention and management (SIG)

Purpose: Physical activity (PA) may mitigate cancer-related cognitive impairment (CRCI), but COVID-19 pandemic restrictions have created challenges for PA. The purpose of this study was to: a) examine the associations between changes in PA and cognitive function in cancer survivors during the pandemic; and b) examine clinical subgroups that moderate this association.

Methods: An online, cross-sectional survey was administered globally to cancer survivors (≥ 18 years of age). Cancer survivors self-reported demographic and clinical variables, regional COVID-19 restrictions, PA prior to and during the pandemic using the modified Godin Leisure Time Exercise Questionnaire, and perceived cognitive function using the Functional Assessment of Cancer Therapy Cognitive Scale (FACT-Cog). Change in PA during the pandemic was categorized into non-exercisers, inactive adopters (inactive before, active during), complete relapsers (active before, inactive during), partial relapsers (meeting combined aerobic and strength guidelines before, only a single guideline during), single guideline maintainers, and combined guideline maintainers. Analysis of covariance examined differences in FACT-Cog scores across the PA change categories in the total sample and across clinical subgroups.

Results: Cancer survivors ($N=454$; $\text{Mage}=48.3 \pm 15.3$ years) were primarily female (71.4%), diagnosed with mainly breast (31.7%), gynecologic (13.2%) and hematologic (12.1%) cancer, and had mean months since diagnosis of 87.0 ± 83.1 . No significant differences were found across the PA change categories on the FACT-Cog or its subscales. Subgroup analyses revealed that when < 5 years of diagnosis, partial relapsers had significantly worse scores on the comments from others subscale compared to inactive adopters (-3.6 points; $p=.01$), complete relapsers (-3.1 points; $p=.02$), single (-3.1 points; $p=.01$) and combined guideline maintainers (-3.1 points; $p=.02$). For underweight/normal weight cancer survivors, combined guideline maintainers had less Perceived Cognitive Impairment (PCI) than non-exercisers (10.04 points; $p=.047$), and partial relapsers (17.8 points; $p=.02$), and higher cognitive functioning on the FACT-Cog than partial relapsers (28.7 points; $p=.04$). Underweight/normal weight partial relapsers had significantly higher PCI (-31.2 points; $p=.04$) and worse cognitive functioning (FACT-Cog; -18.6 points; $p=.03$) than complete relapsers.

Conclusions: PA promotion efforts during the COVID-19 pandemic should consider maintaining PA among cancer survivors closer to their date of diagnosis, as well as retaining a healthy weight to mitigate CRCI.

Chinese immigrant mothers' successful experiences and suggestion of exclusive breastfeeding in Ireland: An exploratory qualitative study

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Special Interest Group: G. Children and families (SIG)

Purpose: This study was conducted to explore the experiences of Chinese immigrant mothers who exclusively breastfed for four to six months in Ireland, and their suggestions on promoting breastfeeding in Ireland. This study was novel in providing solutions to specific barriers to exclusive breastfeeding among the Chinese immigrants.

Methods: Fourteen semi-structured in-depth interviews were conducted with Chinese mothers who were residing in and had breastfed exclusively for four to six months in Ireland. Interviews were recorded and transcribed into Chinese. Thematic content analysis was used to analyze the data.

Results: Two themes were determined for mothers' successful experiences: 1) favourable factors for exclusive breastfeeding (including strong self-determination, appropriate physical conditions, awareness of the benefits of exclusive breastfeeding, free from time constraints, support from the people around them); 2) difficulties with exclusive breastfeeding (e.g. the difficulty of balancing breastfeeding and employment, language barriers, an inability to consume traditional Chinese postpartum diet and a lack of public breastfeeding facilities) and specific solutions (e.g. seeking family support and pumping breast milk when going outside). In addition, participants' suggestions on promoting exclusive breastfeeding in Ireland were summarized, including 1) mothers should be strong mentally and getting support from family and friends; 2) employers should create a supportive workplace by setting up private rooms and breastmilk storage facilities; 3) healthcare professionals should advocate breastfeeding in the hospital and addressing cultural differences by recruiting multilingual staff; 4) the Irish government should promote breastfeeding by initiating societal and policy changes.

Conclusions: Our findings may help researchers understand the needs of Chinese immigrants in successful exclusive breastfeeding, and may have implications for interventions and policy changes that promote breastfeeding among immigrants in Ireland and other countries.

Co-design of contemporary health behaviour change interventions: lessons from the design and development of the Salvio digital platform for cardiovascular disease

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Special Interest Group: D. e- & mHealth (SIG)

Purpose: People living with cardiovascular disease (CVD) require flexible self-management support for health behaviour change for CVD secondary prevention. Digital health interventions can assist with these complex self-management activities. Many stakeholder groups can be involved in digital health design, including people living with CVD (users), researchers, healthcare professionals and technology developers. However, decision-making and aligning views can be difficult to negotiate within interdisciplinary teams, so the use of appropriate methodological strategies is vital. The aim of this study was to co-design and develop the Salvio digital platform.

Methods: A triangulation of research methods was used for this iterative development process. Participatory design (PD) approaches included guided group discussions, activity-based workshops, and think-aloud tasks. Data collection was supported by self-efficacy theory to encourage user contributions. Over a 12-month period, participants met at various time points to collectively design and develop Salvio. Workshops were 2-3 hours in length and were facilitated in small groups of 4-6 participants per session. All sessions were audio-recorded, central parts of workshop conversations were transcribed, and qualitative content analysis of data was undertaken.

Results: Users (n=8) worked collaboratively with researchers (n=5) and technology developers (n=5). Findings indicated that it was critical to include an interdisciplinary team with a wide range of expertise, to build a meaningful and flexible digital platform. Effective methodological strategies were essential for genuine participation and continuous conflict resolution. Our research highlighted key elements that added to the success of this co-design process including i) the creation of a collaborative space where all voices were acknowledged and considered and ii) the effective translation of information during decision-making stages.

Conclusions: Future research is needed to expand and evaluate PD tools and techniques which challenge the power relations between users and other stakeholders. By exploring methods that create space for mutual learning and resolving conflict through systematic decision-making, complex digital platforms for health behaviour change can be successfully developed with diverse groups. It is clear that flexible digital platforms may be valuable to users, but further research will also be required for the successful implementation and knowledge translation of these contemporary developments.

Community gardening as a public health intervention for immigrants' physical activity, nutritious eating, food security and well-being

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Special Interest Group: L. Other

Purpose: There is abundant evidence that community gardening has the potential to improve populations' health and well-being by providing opportunities for physical activity (PA), healthy and nutritious eating, stress management and coherent communities. The benefits of community gardening can be of particular value for immigrants/refugees whose health has been observed to decline over years in the destination country, which is known as the "years since immigration effect". We aim to investigate the impact of community gardening participation on immigrants' PA levels, dietary practices, food security and mental well-being in the Western world. This will inform the development of effective community gardening interventions that promote immigrants' health and well-being and reduce health disparities in immigrants-receiving countries.

Methods: A systematic scoping review of 95 studies was conducted across five electronic databases (Embase, PubMed, Medline, PsycINFO and Anthropology Plus) to locate relevant articles from Europe, Canada, the US, Australia and New Zealand, while adhering to PRISMA guidelines. Both quantitative and qualitative study designs were eligible, and no limits were made on immigrants/refugees' age, gender or country of origin.

Results: Community gardening participation was associated with improved PA levels among immigrants who often lacked familiarity with gym exercise modalities. Community gardens enhanced immigrants' healthy eating by improving their access to nutritious, culturally acceptable produce and reducing their consumption of poor-nutrient, energy-dense foods. Community garden interventions were significantly associated with improved food security levels among immigrants by reducing worry about food running out, tackling food shortage and combating hunger and malnutrition. In addition to improved PA and healthy eating, community gardening enhanced immigrants' social cohesiveness and strengthened their ethnic identity, improving community resilience and mental health and well-being.

Conclusions: Community gardening appears to be an effective health promotion and disease prevention measure that can improve immigrants' health and well-being through multiple pathways. Mixed-method, community-engaged research is needed to thoroughly explore immigrants' perceptions about community gardening and co-identify the elements that constitute effective community gardening interventions. This will help inform the co-development of evidence-based, tailored community gardening interventions that encourage the adoption of healthy behaviours and lifestyle choices, promoting immigrants' health and well-being.

Comparison of clusters of five lifestyle behaviours during late adolescence and young adulthood in the Nicotine Dependence In Teens (NDIT) study

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Special Interest Group: J. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

Purpose: Cluster analysis can be used to group people who are similar in terms of engagement in lifestyle behaviours into non-overlapping groups (i.e., clusters). The Nicotine Dependence In Teens (NDIT) study provides a rich opportunity to investigate clusters of lifestyle behaviours during late adolescence and young adulthood and identify sociodemographic characteristics associated with cluster membership. The NDIT study included up to 20 self-report assessments of five lifestyle behaviours (alcohol consumption, tobacco use, screen time, physical activity, fruit and vegetable consumption) throughout adolescence and 3 assessments in adulthood. It thus provides a unique opportunity to identify clusters of lifestyle behaviours in late adolescence and young adulthood (aim 1), identify sociodemographic characteristics associated with cluster membership at both life stages (aim 2), and examine changes in lifestyle clusters across life stages (aim 3).

Methods: We analyzed lifestyle behaviours and sociodemographic characteristics self-reported during late adolescence (n=804; Mage=16.8) and young adulthood (n=724; Mage=20.4) using the TwoStep cluster analysis procedure, cross-tabulation, and analysis of variance (ANOVA).

Results/findings: Three behavioural clusters were identified in late adolescence, which differed significantly by levels of physical activity, screen time, alcohol consumption, and tobacco use based on ANOVAs. Three behavioural clusters were also identified in young adulthood, which differed significantly by levels of alcohol consumption and tobacco use based on ANOVAs. At both life stages, significant differences were observed across clusters by sex, maternal education, place of birth (participant, parent) and ethnicity based on ANOVAs. Cross-tabulation of the proportion of participants in each cluster in young adulthood based on cluster membership in late adolescence indicates that 50.4% of adolescents moved to a cluster with higher alcohol consumption and tobacco use; 33.9% remained in a cluster with similar alcohol consumption and tobacco use; 15.5% moved to a cluster with lower alcohol consumption and tobacco use.

Conclusions: Many studies focus on a single lifestyle behaviour. Our results suggest there are distinct clusters of lifestyle behaviours. Moreover, most adolescents increase alcohol consumption and tobacco use in young adulthood regardless of behaviours in adolescence. Investigation into explanatory factors underlying clustering is necessary to increase the likelihood of interventions effectively targeting lifestyle behaviours.

Community-based, cluster randomized controlled trial increases physical activity in diverse, low income older adults over 18 months

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Special Interest Group: A. Ageing (SIG)

Purpose: Older adults are the least active population group in the U.S. Low income and diverse communities have fewer physical activity (PA) resources and facilities, contributing to lower PA and health disparities. This study assessed the hypothesis that low income and diverse older adults participating in the multilevel Peer Empowerment Program 4 Physical Activity (PEP4PA) would increase moderate-to-vigorous PA (MVPA) and improve blood pressure (BP), physical function, perceived quality of life (PQoL), and depressive symptoms to a greater extent than those receiving usual senior center programming.

Methods: In a cluster-randomized controlled trial (RCT) in 12 senior centers, 476 older adults (mean age 71.4 years, 60% low income, 38% minority) were assigned to a PA intervention (n=267) or control (n=209) condition. The peer-led intervention included individual self-monitoring and counseling, group walks and social support, and community advocacy to improve walking conditions. Outcomes included daily minutes of MVPA (via accelerometry), systolic and diastolic BP, 6 minute walk test (6 MWT), PQoL (PQoL-20) and depressive symptoms (CES-D-10) at baseline, 6, 12, and 18 months. To account for multiple measurement days and clustering of participants within centers, mixed effects regression models with random effects estimated the intervention effects on all outcomes between groups over time. Models were adjusted for imbalanced baseline covariates. Three-way interactions assessed effect modification by sex and income.

Results: Compared to controls, intervention participants significantly increased MVPA from baseline at 6, 12, and 18 months by 9, 11 and 9 minutes/day, respectively ($p < 0.01$). The intervention group also increased mean PQoL scores compared to controls at 6 and 18 months. No effects were observed for other outcomes. Increases in MVPA in the intervention group was greater among males and those with higher incomes, compared to females and low income participants.

Conclusions: This multilevel RCT achieved sustained increases in MVPA and PQoL in a diverse cohort of older adults. The community-based intervention provides a sustainable model to improve health behaviors in an at-risk and often difficult to reach aging population. Further exploration is needed to understand what components of the intervention may be modified to address the differential effects by sex and income.

Considerations for designing physical activity interventions for women aged 50+: Participant perspectives

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Special Interest Group: **B. Motivation and behavior change (SIG)**

Purpose: The Active Women over 50 (AWo50) trial evaluated a low-dose information/support intervention to enhance physical activity in employed women aged 50+. This qualitative study explores participants' perspectives on factors to consider when designing physical activity interventions appropriate for women aged 50+.

Methods: Semi-structured interviews were conducted with participants who had completed the AWo50 program. Interviews were audio-recorded and transcribed verbatim. Data were managed in NVivo12. One researcher used an inductive analytic approach to generate recurrent themes on program and contextual factors which hindered and promoted physical activity. Themes were checked against the data by two other researchers early in the analysis, interpretations were refined, and final themes were derived in consultation with the research team.

Findings: The female participants (n=20) had an average age of 56.4 years (SD4.5) and worked 35.6 hours (SD10.1) on average per week. Four participants worked in a health-related field, nine had carer responsibilities, and nine had previously participated in structured physical activity. The analysis generated four themes describing what attracted participants to the AWo50 program and their experience of the program. These were: (1) Age matters, (2) Physical activity is social, (3) Structure for physical activity, and (4) Self-responsibility. Participants noted a range of personal and contextual factors particular to their age which affect their physical activity generally but also shaped their affinity for AWo50. There was a complex interaction between these factors and a strong sense of self-responsibility to become more active. The program's unstructured approach (participants chose the amount and type of physical activity) was helpful for some who valued autonomy in physical activity, while others would have preferred greater structure (such as social support, program accountability, and tailored feedback) to sustain involvement in the face of competing demands from family and work.

Conclusions: Interventions aimed at an individual level are operationalised within broader systems and need to consider the complex interplay between personal, environmental, and behavioural influences. Future iterations of the program could draw on the sense of agency conferred by the self-responsibility narrative but bolster maintenance by integrating social support and flexibility in program features to address contextual threats.

Core lifestyle intervention components for postpartum weight management: systematic reviews and meta-analyses through PIPE, TIDieR and BCT frameworks

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Special Interest Group: E. Implementation and scalability (SIG)

Purpose: To identify the core implementation components required for postpartum weight management intervention delivery and content. This study aimed to 1) determine the core components in intervention delivery through the TIDieR (Template for Intervention Description and Replication) and PIPE (penetration, implementation, participation, effect) framework analyses and 2) identify core components for intervention content through BCT (Behaviour Change Techniques) analysis.

Methods: Systematic review and meta-analysis of randomised controlled trials involving lifestyle modification of diet, exercise or behavioural interventions for postpartum women (within 2 years after birth) using a framework analysis of PIPE, TIDieR and BCTv1. MEDLINE, EMBASE and other databases were searched up to 3rd May 2019. The quality of the studies were appraised using the Cochrane Risk of Bias tool (2.0).

Results: Thirty-six trials (49 publications) were included (n=5315 women, age 18-36 years). Only one study provided sufficient information to calculate the population penetration rate (2.5%). Over half had low programme fidelity with no reported intervention manual or structured curriculum, checklist or other measures of quality assurance. Participation rate was available for nine studies (0.94% to 86%). Lifestyle intervention resulted in significant weight loss of (MD, mean difference -2.33 kg, 95% CI, confidence interval -3.10 to -1.56 kg). Health professional-delivered interventions had significantly greater weight loss than those delivered by non health professionals (-3.22 kg vs -0.99 kg, P = 0.01 for subgroup differences). Diet and physical activity combined had significantly greater weight loss compared with physical activity-only interventions (-3.15 kg vs -0.78 kg, P = 0.009 for subgroup differences). BCTs on problem-solving, goal setting of outcome, review outcome goal, feedback on behaviour, self-monitoring of behaviour, behavioural substitution and credible source were associated with lower energy intake.

Conclusions: The core components for intervention delivery for lifestyle intervention in postpartum women include both diet and physical activity, delivery by health professionals and behaviour change techniques covering self-regulation skills. While insufficient, the limited evidence available suggests low penetration and participation rates further highlighting the inadequacy of conventional RCTs to inform implementable interventions.

Cost of habitual diets by socioeconomic group in Australia

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Special Interest Group: I. Socio-economic inequalities (SIG)

Purpose: This study compared habitual (current, unhealthy) diet costs across Australian socioeconomic groups (SEGs), utilising modifications of the Healthy Diets Australian Standardised Affordability and Pricing (HD-ASAP) protocol. Surprisingly, detailed quantitative evidence regarding food group intakes and dietary costs of low SEGs compared to higher SEGs has been lacking.

Methods: The Confidential Unit Record Files (CURFs) of the Australian Health Survey National Nutrition and Physical Activity Survey were analysed to describe the reported dietary intake of three reference households in each SEG quintile (defined by household income). Household A included two adults and two children; Household B included one adult and two children; and Household C included two older, retired adults. The habitual diet pricing tool of the HD-ASAP protocol was modified to align with these dietary intakes. Food pricing data from food outlets in one location were collected and analysed to determine the cost of habitual diets for each reference household across SEG quintiles.

Results: Low SEGs reported habitual diets of significantly lower cost than higher SEGs for Households A and C. No significant difference was found across SEG quintiles for Household B. When the diets were divided into healthy and discretionary (not needed for health and high in saturated fat, added sugar, salt and/or alcohol) components, the cost of reported intakes of healthy foods tended to increase from the lowest to highest SEG quintile for all reference households, but costs of discretionary food intakes were similar across quintiles. Analysis of more granular food group costs shows additional differences between SEGs.

Conclusions: The lower healthy food and total dietary costs in low SEGs compared to higher SEGs, reflecting lower intakes, helps explain the higher rates of diet-related disease experienced in low SEGs. The findings can inform potential policy action to improve food environments and affordability of healthy foods, and drive healthier diets among low SEGs.

Cost-effectiveness of physical activity programmes and services for older adults: a scoping review

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Special Interest Group: E. Implementation and scalability (SIG)

Purpose: Physical activity promotes health and wellbeing in older age. Implementation of effective physical activity interventions needs to consider value for money. This scoping review aimed to assess the evidence of economic evaluations of physical activity interventions for people aged 60+. The specific questions were: 1) what is the volume of systematic review evidence regarding economic evaluations of physical activity interventions for older people? (review of reviews); 2) what is the volume of cost utility analysis (CUA) of physical activity interventions for older people? (review of CUA studies); 3) what are the literature gaps requiring future research?

Methods: Review of reviews: a search for systematic reviews of economic evaluations of physical activity interventions for people aged 60+ was conducted in PEDro, MEDLINE, CINAHL, and the Cochrane Database of Systematic Reviews (January-2010 to November-2020).

Review of CUA studies: we searched the Tufts Cost-Effectiveness Analysis Registry to identify individual studies investigating cost-utility of physical activity interventions for older people. Two independent reviewers performed screening and data extraction of included studies.

Results/findings: Review of reviews: we found 10 potential reviews, but none fully met our inclusion criteria, as they were not focused on physical activity interventions, economic evaluations, or older people. For these reviews, we only extracted information from the individual studies that met our criteria (n=29). All studies included in the reviews investigated the cost-effectiveness of structured exercise and most revealed that the intervention was more costly but also more effective compared to no intervention.

Review of CUA studies: we included CUA from 18 individual studies, and all investigated structured exercise programmes. Most studies (n=15) found that the intervention was more costly and also more effective, and two interventions were cost-saving.

Conclusions: Very few systematic reviews investigated the cost-effectiveness of physical activity interventions for older people and none were conducted investigating only physical activity interventions. All included studies investigated structured exercise programmes and, in general, the interventions were more efficient and also more costly when compared to no intervention. A review of individual studies is needed to summarise the evidence on value for money of physical activity interventions for older people.

COVID-19 and Food Security: Describing the changing environment of home visiting resources and support for families during a pandemic

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Special Interest Group: **G. Children and families (SIG)**

Purpose: Home visiting programs are federally funded and part of a range of services that can help mitigate the developmental consequences of many risks during early childhood. One area of support home visitors (HV) provide to families are connections to local food resources. This paper aims to describe how home visiting programs in Texas adapted to the changing need for nutrition resources among families participating in their programs during the COVID-19 pandemic in Texas.

Methods: Structured interviews were completed with home visiting programs in Texas in April and May 2020. All participants were asked questions about how they identify families experiencing food insecurity, what kind of supports and referrals are provided, and how their program shifted because of COVID-19. All interviews were voice recorded and transcribed. Content and thematic coding was completed by trained research staff.

Results: Overall, 18 interviews were completed with at least two individuals of different levels (director, supervisor, home visitor) from 14 of 15 federally funded home visiting programs in Texas. Support for food access was commonly reported across programs as one of their most effective referrals, most often facilitated by a close, working relationship with their local food bank and/or pantries. HV suggested that they commonly identify families with food insecurity through informal discussion with the family. Results suggest the COVID-19 pandemic led to sharp increases in reported food needs by families. To support families, HV described two primary ways they met the food needs of families during a pandemic: direct grocery gift card distribution to families and direct delivery of emergency food boxes from the local food bank by the HV.

Conclusions: Access to nutritious food became a heightened concern for many families during COVID-19 pandemic. To meet the immediate needs of families, home visiting programs stepped up to the challenge with innovative use of resources to meet the needs of families by leveraging funds to provide grocery store gift cards and community resources in the form of emergency food boxes. Future innovations and program strategies in home visiting should consider providing this flexibility to meet the nutrition needs of families.

Culinary medicine and culinary nutrition education provided to health and education students and practising professionals: A scoping review

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Special Interest Group: L. Other

Purpose: Culinary medicine (CM) or culinary nutrition (CN) education provided to professionals with the capacity to support health behaviour change in others is an emerging strategy to promote diet quality and reduce diet-related chronic disease burden. The aim of this scoping review is to synthesise the literature describing CM/CN provided to, and by health, education and culinary professionals, or students of these disciplines.

Methods: This review was guided by Preferred Reporting Items for Systematic Reviews and Meta-Analysis extension for Scoping Reviews (PRISMA-ScR). Eleven electronic databases were searched. Eligible studies included: (i) nutrition, health or lifestyle programs with a CM/CN component, (ii) study participants working or training in health, community and/or adult education or culinary roles, or programs facilitated by people working or training in health, community and/or adult education or culinary roles where facilitator training was described, (iii) published in English from 2003. Title, abstract, full text screening and data charting was completed by two reviewers.

Results/findings: Thirty-three studies were included. Most studies (n=22) delivered programs to general population groups facilitated by CM/CN trained health professionals and/or university students from health disciplines, while other studies (n=11) delivered CM/CN training to university students or health professionals. Of these studies, seven were programs provided to medical students, two to nutrition and/or dietetic students, one to nutrition and medical students together and one to qualified physicians and healthcare professionals. Twenty-five studies were based in the USA and one study in Australia, Netherlands, Brazil, Iran, Israel, China, Singapore and Kenya. The evidence indicates that CM/CN programs provided to health professionals or students of health disciplines can improve competency in nutrition counselling and culinary practice; and improve dietary patterns of the health professional or student, and their patients or clients.

Conclusions: Further research is needed to provide evidence for effectiveness of CM/CN programs in improving culinary skill and diet-related health practices, and to optimise content, format and timing of CM/CN programs. Research evaluating the impact of CM/CN training to education and culinary professionals, who potentially have the capacity to influence healthy cooking behaviour is needed.

Decision on breastfeeding during Coronavirus Disease 2019 (COVID-19) pandemic: a review of the current evidence and recommendations

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Special Interest Group: F. Early care and education (SIG)

Purpose: Coronavirus Disease 2019 (COVID-19) has spread worldwide. Attention has been paid to pregnant women and their newborns, as they are vulnerable groups. However, the safety of breastfeeding and breastfeeding methods have not yet reached consolidate agreement around the world. The present study aims at summarizing the current scientific evidence including the safety of breast milk and wellbeing of breastfed infants of the infected mothers, and summarizing the current recommendations during the COVID-19 pandemic.

Methods: A comprehensive literature search on the relationship between COVID-19 and breastfeeding to date was conducted. The scope of the literature search included journal article databases (including PubMed, Web of Science, and CNKI) and official websites of health organizations worldwide.

Results: The majority of studies to date focused on whether breast milk from infected mothers contains SARS-CoV-2 virus, and mainly demonstrated negative results. However, evidence on antibodies, ingredients of antiviral drugs in breast milk and follow-up outcomes among breastfed infants born to the infected mothers was limited. Besides, among studies that have detected SARS-CoV-2 in breast milk, only a few studied the activity of the virus. Breastfed infants were not likely to develop viral infections; while contamination of the milk containers appeared to be a threat. The Holder pasteurization process could inactivate SARS-CoV-2 in breast milk. According to the current recommendations, direct breastfeeding with precautions is generally suggested as the first choice. For very sick mothers, it is recommended to express breast milk with precautions and feed the infants by a healthy caregiver.

Conclusions: Although currently the effects of breastfeeding on SARS-CoV-2 infection are unclear, breastfed infants are less likely to develop other viral infections. Our review also suggests a need to further evaluate the safety of breastfeeding, with specific focuses on viral test of breast milk samples collected at multiple time points, specific antibodies and drugs for COVID-19 treatment in breast milk, and follow-up health assessments of infants who were directly breastfed by their infected mothers.

Decreasing consumption of sugar-sweetened beverages and Raising tap water consumption through Interventions based on Nutrition and sustainability for Kids (DRINK): protocol of a cluster randomized controlled trial

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Special Interest Group: B. Motivation and behavior change (SIG)

Despite some decrease in Western countries, regular sugar-sweetened beverage consumption is at the top of the alarming dietary habits worldwide. The effectiveness of actions to reduce their consumption and the methods for evaluating them need to be improved. Furthermore, in a context of growing concern about sustainable food systems, little is known about sustainability-focused interventions. The objective of this cluster randomized controlled trial is to evaluate the long-term effectiveness of nutrition- and sustainability-based interventions on the reduction in SB intake and on the increase in tap water consumption in 4th-to-6th-grade children.

French-speaking Belgian primary schools will be randomized using a factorial plan: (i) control; (ii) nutrition-based intervention; (iii) sustainability-based intervention; and (iv) both. The estimated sample size needed is 48 schools (i.e. around 3.500 pupils followed-up over two years). Interventions (information meetings, water breaks, provision of posters, flyers, reusable cups and glass bottles...) will take place from September 2021 to June 2023. The distinction between intervention groups will be made through the nature of the information given.

Children and schools will be evaluated in Spring 2021, 2022 and 2023. The main quantitative judgement criterion will be the change over time in mean sweetened beverage consumption. Daily mean beverage consumption will be estimated through a 4-day diary. An internal calibration study will be carried out to take into account the measurement error in beverage intake estimation (n=130). A large set of information on nutrition-related behaviors, perception of environmental risks and related behaviors, and other characteristics will be collected among children and their parents. Repeated audits will be performed in all schools to assess involvement of the staff in health promotion actions, feasibility of such actions... A qualitative assessment will specifically aim at identifying barriers and enablers in the transmission of health messages coming from the school towards the families. At last, the total cost of interventions will be monitored to anticipate the potential generalization. To note, the trial is funded by public Belgian stakeholders. The originality of this three-year project lies in studying the potential interacting effectiveness of interventions including levers in both nutrition and sustainability domains.

Development and psychometric properties of the Sleep Parenting Scale for Infants (SPS-I)

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Special Interest Group: G. Children and families (SIG)

Purpose: Despite parent-child bedtime interactions are crucial to children's sleep quality, few validated tools exist to capture sleep parenting among parents with infants. This study developed a Sleep Parenting Scale for Infants (SPS-I) and aimed to (1) explore and validate its factorial structure, (2) examine its measurement invariance across mothers and fathers, and (3) investigate its reliability and concurrent validity.

Methods: SPS-I was developed via a combination of items modified from existing scales and the development of novel items. 340 mothers and 152 fathers (152 dyads from the same household and 188 independent mothers) (51.8% white, mean age=34.6) from the Rise and SHINE (Sleep Health in INfancy and Early childhood) cohort study completed a 14-item SPS-I for their 12-month old infant. Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were used to explore and validate SPS-I's underlying structure. Multi-group CFA was then used to examine measurement invariance across mothers and fathers. Reliability was examined using Cronbach's alpha. Concurrent validity was examined using linear regressions exploring associations between SPS-I factors and parent-reported infants nighttime sleep duration. Data were collected between 2017 and 2019, and were analyzed in 2020.

Results: EFA and CFA confirmed a 3-factor, 12-item model: sleep routine, sleep autonomy, and media use at bedtime. SPS-I was invariant across mothers and fathers and was reliable. All three factors were associated with infants nighttime sleep duration.

Conclusions: SPS-I has good psychometric properties, supporting its use for characterizing sleep routine, sleep autonomy, and media use at bedtime by mothers and fathers.

Development and Qualitative Evaluation of the E-Supporter: A Text-Based Intervention to Support Physical Activity and Healthy Nutrition in People with Type 2 Diabetes Mellitus

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Special Interest Group: D. e- & mHealth (SIG)

Purpose: Text-based interventions are considered as an effective and relatively simple technology for health promotion purposes. The E-Supporter is a text-based (SMS and e-mail) lifestyle coaching intervention to encourage physical activity and healthy nutrition in people with Type 2 Diabetes Mellitus (T2DM). This study aimed to develop and qualitatively evaluate the first E-Supporter version tailored to the Stages of Change and self-efficacy levels.

Methods: The development of the E-Supporter was based on scientific evidence, theory and experts input. Furthermore, 13 diabetes experts participated in two focus groups to evaluate the E-Supporter on readability, relevance and correctness of the provided information. Lastly, the E-Supporter was evaluated in a field test of 9 weeks by 20 people with T2DM. Participants wore a Fitbit for measuring physical activity and kept a food diary for assessing eating behavior. Besides, participants received two text messages per day and one email weekly. At the end of the nine-weeks, telephone interviews were conducted to assess the E-Supporter on perceived effectiveness, ease of use and content quality. The interview transcripts were inductively coded, clustered and sorted into general themes.

Findings: A total of 279 SMS messages and 9 email formats were discussed in the focus groups of which 208 SMS messages were approved immediately, 56 messages were adapted before approval, 15 messages were excluded and minor textual adjustments were made to all email formats. The final version of the E-Supporter consisted of 264 informational and motivational SMS-messages (103 targeting physical activity and 161 targeting nutrition) tailored to the Stages of Change and 9 email formats containing feedback on behavior based on Fitbit and food diary data tailored to self-efficacy levels. Participants were predominantly positive about E-Supporter; they thought that the E-supporter can support them in achieving a better lifestyle and experienced high ease of use. Both the content of messages and e-mails were appreciated, even though most participants preferred the e-mails because these were perceived as more personal.

Conclusions: Based on the first positive evaluation results, we expect the E-Supporter to be a useful intervention to promote physical activity and healthy nutrition in people with T2DM.

Diet quality is associated with psychological distress, depression and anxiety in emerging adults: results from a nationally representative observational sample

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Special Interest Group: K. Disease prevention and management

Background: Depression, anxiety and their related symptoms are a leading cause of global disability and economic burden. Three quarters of all mental disorders occur by the age of 24 years making the identification of modifiable risk factors during these years imperative for prevention. This study examined associations between diet and psychological distress, depression and anxiety in a nationally representative sample of Australians during emerging adulthood.

Methods: Cross-sectional data (N= 1,340) from the 2017-18 Australian National Health Survey were analysed including fruit, vegetable and sugar sweetened beverage consumption. The primary outcome was psychological distress measured by the Kesler Psychological Distress Scale. Self-reported depression and anxiety were secondary outcomes. Ordinal logistic regression analyses were fitted and adjusted for demographic and lifestyle factors.

Results: Adjusted odds of high psychological distress were 44% greater among participants not meeting daily fruit intake guidelines (OR 1.44; 95% CI 1.13–1.84). Failure to meet fruit intake guidelines was associated with 63% and 55% increased odds for depression (OR 1.63; 95% CI 1.00–2.70) and anxiety (OR 1.55; 95% CI 1.02–2.38), respectively. Trends for vegetable and sugar sweetened beverage consumption were in the expected direction; however, did not reach statistical significance in adjusted models. Adjustment for lifestyle factors rendered results statistically non-significant across all outcomes

Limitations: This study is limited by reliance on cross-sectional, self-reported data and use of rudimentary diet proxies.

Conclusions: These findings support an association between diet and mental health amongst emerging adults. Further longitudinal studies in this age group are warranted to investigate the directionality of this association.

Keywords: Depression, anxiety, nutritional psychiatry, prevention, emerging adulthood, diet

Diet Quality Patterns and Cardiometabolic Risk Factors in Children and Adolescents: Longitudinal Analysis

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Special Interest Group: G. Children and families (SIG)

Purpose: Few prospective studies have examined the associations between diet patterns and the development of cardiometabolic risk factors over time in children and adolescents. The current study examined the longitudinal association between alternate Mediterranean Diet (aMedDiet) score and cardiometabolic risk factors in Mexican children and adolescents.

Methods: The analytic sample is composed of 686 participants (51.02 % female) in the Early Life Exposures in Mexico to ENvironmental Toxicants (ELEMENT) birth cohort in Mexico City birth cohort study, who were followed at up to four-time points from 6 to 21 years. At each visit, diet quality was assessed by deriving adherence to the Mediterranean diet (aMedDiet) score from a validated semi-quantitative food frequency questionnaire. To detect a dose-specific relationship, aMedDiet score was divided to quartiles, with the lowest quartile set as the reference group. At each study visit, six cardiovascular risk factor measures were collected: waist circumference, systolic and diastolic blood pressure, serum glucose, high-density lipoprotein cholesterol (HDL-C), and triglyceride. Linear mixed models with random intercepts were used to model the longitudinal association with repeated assessments between aMedDiet and each cardiometabolic risk measure. Models were adjusted for age at each visit, sex, maternal parity and education, delivery mode, sexual maturation, and other covariates.

Results: The mean age (years) at baseline was 8.20 (± 2.08) and at the last follow-up visit was 16.43 (± 2.14). A positive longitudinal association was detected between aMedDiet score and serum HDL-C where participants in the highest vs. lowest quartile of aMedDiet score had higher serum HDL-C ($\beta = 1.08$ mg/dL (1.03), p -value < 0.01), and a linear trend was found (p -value < 0.01) for serum HDL-C. No relationship was detected with other cardiometabolic risk factors.

Conclusions: Our findings showed a positive longitudinal association between higher diet quality and serum HDL-C among Mexican children. These findings highlighted the importance of childhood diet and the development of cardiometabolic risk factors.

Funding Sources: NIH/NIEHS

Differences in health behaviours before and during the pandemic, and based on phases of pandemic restrictions in Ireland

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Special Interest Group: H. Policies and environments (SIG)

Purpose: The COVID-19 pandemic and related restrictions can adversely impact antenatal maternal well-being and health behaviours, including physical activity, diet and sleep. To examine differences in health behaviours, as well antenatal stress and stress-reduction strategies, and social support between women pregnant before and during the pandemic in Ireland.

Methods: 210 pregnant women were recruited online and in the antenatal department of a tertiary maternity hospital before the pandemic, and 235 women recruited online during the pandemic in June and July 2020. Only women resident in Ireland were included in this study. Women completed self-report measures of health behaviours including physical activity, diet and sleep. Women also completed self-report measures of stress, and social support. Independent samples t-tests and Chi-squared tests were used to examine differences in outcomes were examined between women pregnant before and during the pandemic, and between Phase 2 and Phase 3 of the Irish Government COVID-19 restrictions.

Findings: There were no differences for healthy eating ($p=.42$) or sleep ($p=0.17$). Women pregnant during the pandemic reported less physical activity ($p=0.06$) health behaviours but women reported less physical activity during the pandemic. Women reported higher stress and lower social support during the pandemic, but this did not impact on self-reported physical activity. No differences were observed between phases of pandemic related restrictions for any outcome.

Conclusions: Our findings highlight negative impacts of the pandemic on physical activity, as well as social support and stress, which can have implications for maternal and child health. Lack of differences between restriction phases suggests on-going negative effects for antenatal well-being and behaviours irrespective of easing of pandemic-related restrictions. Greater attention to the impact of the pandemic of prenatal health behaviours such as physical activity is needed to mitigate adverse impacts for women and infants.

Direct observation of physical education classes to assess class length, physical activity level, lesson context, and teacher behavior in Mexican elementary schools

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Special Interest Group: J. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

Introduction: In Mexico, 35.6% of school-age children are overweight or obese. Likewise, 29.0% of the Mexican population does not meet the World Health Organization (WHO) physical activity (PA) recommendations. Increasing the quantity and improving the quality of physical activity among children has gained relevance. Thus, the physical education (PE) class component becomes an essential and low-cost tool for successful interventions on PA. It is thus imperative to study PE classes to better understand its relationship with PA.

Methods: The System for Observing Fitness Instruction Time (SOFIT) was used to objectively assess the quality and quantity of the PE lessons. One hundred and thirty-nine observations were conducted in six Mexican rural elementary schools. Grades were stratified into three groups, according to the Mexican national education curriculum.

Results: The average PE class length and minutes of MVPA were 39.7±10.6 and 21.3±7.1, respectively, with significant differences found between groups. MVPA in PE lessons met international recommendations, with an average minute ratio of 0.51±0.12, 50.5 % of the total lesson length. Regression models found 'knowledge' lesson context categories to have a significant negative impact on PE MVPA ($\beta = -0.46$, $P < 0.001$; $\beta = -0.35$, $P < 0.01$; $\beta = -0.73$, $P < 0.001$). Teacher behaviour categories (promotion and demonstration fitness) had a significant positive relationship on PE MVPA for second and third groups ($\beta = 0.42$, $P < 0.001$; and $\beta = 0.42$, $P < 0.001$; respectively).

Conclusions: Students did not achieve the national PE lesson length standards. However, the international MVPA minutes from PE lessons standards were achieved. Nevertheless, those minutes were not enough to meet the WHO PA standards (150 MVPA minutes a week). Schools will require at least four weekly PE lessons to meet the WHO PE lessons recommendations. Quality of PE lessons needs to be improved with more teacher involvement to avoid sedentary and low PA to MVPA lesson contexts.

Directly measured physical activity accelerometer metrics assessed in English boys and girls aged 6 to 13 years

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Special Interest Group: G. Children and families (SIG)

Purpose: Accelerometer-assessed physical activity outcomes are traditionally based on cutpoints and expressed as time spent in absolute activity intensities. In recent years alternative metrics derived directly from raw accelerations and that are not subject to the limitations of cutpoints have been introduced. However, little is known about these metrics in boys and girls across a wide age range. We aimed to assess average acceleration (activity volume), intensity gradient (intensity profile), and M60 (minimum acceleration for the most active 60-minutes) metrics in primary and secondary school boys and girls.

Methods: This is a pooled secondary analysis of data collected in northwest England between 2015-2019. Two-hundred-and-fifty-eight lower primary school children (LPS; age 6.0 years, 144 girls), 788 upper primary school children (UPS; age 10.1 years, 405 girls), and 450 secondary school adolescents (SS; age 13.6 years, 328 girls) participated. Wrist accelerometers were worn for 7 days. Average acceleration, intensity gradient, and M60 metrics were calculated based on a 16-hour waking hours day. Adjusted mixed linear models investigated differences between sex and age groups.

Results: Boys were significantly more active than girls for each metric in all age groups ($p < .001$). SS boys and girls were significantly less active than UPS boys and girls for all metrics ($p < .001$). There were no differences in average acceleration or M60 between LPS and UPS boys or girls ($p > .05$). The intensity gradient of UPS children was though significantly greater than for LPS children, with the largest difference seen in girls ($p < .001$). M60 values equivalent to brisk walking (~290 mg) were observed in <20% of LPS boys and in no LPS girls. The most active 60% and 30% of UPS and SS boys respectively, had M60 values equivalent to brisk walking (~220 mg), while 40% of UPS girls and no SS girls had M60 values this high.

Conclusions: Boys were more active than girls irrespective of metric or age group. UPS children's intensity profiles suggested that they spent more time in higher intensity activities than LPS and SS peers. Directly measured accelerometer metrics can effectively describe the physical activity volume and intensity of children and adolescents.

Disadvantaged adolescents and vegetable intake: a systematic review of the determinants

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Special Interest Group: I. Socio-economic inequalities (SIG)

Purpose: Vegetable intake among disadvantaged adolescents is particularly low. Findings on the determinants of vegetable intake in young populations remain inconsistent. To date, no review on this topic has particularly focused on disadvantaged adolescents. Therefore, this systematic review aimed to investigate the determinants of vegetable intake in disadvantaged adolescents.

Methods: Five electronic databases (PubMed, Web of Science, CINAHL, PsycINFO and ERIC) were searched from January 2013 to October 2020. The search strategy used the following set of descriptors: vegetable intake, adolescents, and determinants and correlates. Studies published in peer-reviewed journals were included if they comprised a sample of disadvantaged individuals aged 12-18 years, examined an association between vegetable intake as a separate outcome and at least one hypothesized determinant, and were conducted in urban settings of high-income countries.

Results/findings: Thirteen studies meeting the inclusion criteria were included (10 cross-sectional, two longitudinal, one cross-sectional and one longitudinal). The main reasons for the exclusion of full texts (n=144) were not targeting disadvantaged samples or adolescents, and not investigating vegetable intake either separately or at all. Encouraging others to eat vegetables was consistently associated with higher own vegetable intake; however, these conclusions were drawn from two related samples and thus cannot be considered as independent findings. Nutrition knowledge was the only determinant consistently investigated in several independent samples and it was not associated with vegetable intake in disadvantaged adolescents. We failed to observe a consistent pattern of association between any of the remaining determinants and vegetable intake in this population group, probably due to the low number of papers that met the inclusion criteria.

Conclusions: Our results suggest that intervention studies aiming to promote vegetable intake by exclusively providing nutrition education may not be effective. Other strategies, such as involving teenagers to promote vegetable intake, may be more successful. More research is warranted to investigate determinants of vegetable intake in disadvantaged youth at different societal levels, preferably with longitudinal designs and involving large and representative samples. There is a need for further research on the determinants of vegetable intake to gather more evidence and guide the development of successful interventions in disadvantaged adolescents.

Do energy expenditure differences across work postures influence cognitive processing speed? A counter-balanced randomised cross over trial

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Special Interest Group: E. Implementation and scalability (SIG)

Background: Anecdotal evidence link occupational sedentary behaviour, low energy expenditure (EE) and cognitive dysfunction. Nevertheless, EE across different work postures including active workstations remains unclear and its influence on cognitive processing speed is yet to be established.

Objective: We aimed to investigate differences in EE across various work postures and influence on cognitive processing speed.

Methods: In our counterbalanced randomised trial, sixteen desk-based employees performed simulated work tasks (typing, reading and cognitive tasks) in three different work positions (sitting, standing, walking) in three different days. EE was measured for three days consecutively for 30-minutes in each simulated position using indirect calorimetry. Processing speed was assessed through computer-based choice reaction times during each work posture. The outcome variables of interests (EE, reaction times and accuracy) were compared between work positions using repeated measures ANOVA and Pearson correlation.

Results: Walking EE in walking was higher (5.57 ± 0.45 Kcal) than sitting (1.07 ± 0.12 Kcal) and standing (1.88 ± 0.42 Kcal). Total EE was significantly higher in walking than standing (35.17 ± 6.86 Kcal) and sitting postures (41.37 ± 8.46 Kcal). We did not find any significant differences in reaction times between different work postures except within standing work condition (60.22 ± 13.97 ms). Accuracy was found to be reduced in walking compared to sitting ($0.76 \pm 0.83\%$) and standing ($0.43 \pm 0.09\%$) but not reached significance.

Conclusions: Though significant differences in EE were observed between work postures, walking or standing at work did not affect the cognitive processing speed.

Do food tracking apps differ in acceptability, induced food-related cognitions and behaviour? A pilot study

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Special Interest Group: D. e- & mHealth (SIG)

Purpose: Smartphone apps have become popular for tracking food intake in daily life. However, the wide range of available apps differ substantially in the implemented tracking features such as photo-based recording, food databases, and recording of serving sizes, and thus the required input. The present study investigated whether differences in the required input are related to acceptability, induced food-related cognitions and behavior.

Methods: In an online study, 30 participants were randomly assigned to viewing one of two app mock-ups, consisting of screenshots and a verbal description: (1) “simple” app requiring to take one photo of their meal; (2) “complex” app requiring to take a meal photo, identifying the meal components in a database or by free-text input, and providing the serving size. Subsequently participants were asked to rate the app’s acceptability for tracking food intake in daily life and potential consequences of tracking on food-related cognitions, intentions, and behavior.

Results: The simple app was perceived to be more feasible ($t(28) = -3.81$, $p = .001$, Cohen’s $d = 1.38$) and to induce fewer food-related cognitions ($t(28) = -3.72$, $p = .001$, Cohen’s $d = 1.38$) compared to the complex app. No significant differences were found regarding intentions or eating behavior ($t(28) = -0.68$, $p = .504$).

Conclusions: Complex food tracking apps provide a higher level of detail, but recording is more cumbersome and induces more food-related cognitions that may impact behavior. Depending on the goal of the study, careful considerations have to be made regarding the choice of the tracking app.

Does the neighbourhood matter? Perceptions of barriers and facilitators for physical activity of adolescents from diverse socioeconomic neighbourhoods

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Special Interest Group: I. Socio-economic inequalities (SIG)

Purpose: Adolescents from families of lower socioeconomic position (SEP) tend to be less physically active than their counterparts from higher SEP families. Research on adolescents, socioeconomic inequalities, and physical activity needs to look beyond only the individual level to understand how environmental factors interact and influence social inequalities in physical activity. The present qualitative study takes an ecological view exploring how adolescents and their parents from higher and lower SEP neighbourhoods in Oslo, Norway, perceive the social, organisational and physical environment to influence adolescents' physical activity behaviours.

Methods: We conducted six semi-structured focus groups with 35 13–14-year-olds and eight interviews with some of their parents. The interviewees were recruited from one higher and two lower SEP neighbourhoods in Oslo, Norway. Theme-based inductive coding was used for analysis.

Results: The results indicate that the barriers and facilitators for physical activity varied between the SEP neighbourhoods. Factors like social norms in a neighbourhood could shape adolescents' physical activity behaviour, and a social norm of an active lifestyle seemed to be an essential facilitator in the higher SEP neighbourhood. Higher availability and high parental engagement did also seem to facilitate higher physical activity in this neighbourhood. In the lower SEP neighbourhoods, the availability of local organised physical activity and volunteer participation and engagement from parents varied. Programmes from the municipality and volunteers seemed to influence and be essential for adolescents' physical activity behaviour in these neighbourhoods.

Conclusions: The results indicate that the perceived barriers and facilitators for physical activity varied between the SEP neighbourhoods and that several factors could affect adolescents' physical activity levels. The results illustrate a limitation in explaining the phenomenon if the focus is primarily at the individual level in an ecological model and not at several levels at the same time. An extra focus towards the lower SEP neighbourhoods and opportunities for organised physical activity for all adolescents could facilitate physical activity behaviour. The results could inspire interventions and policy actions aiming to promote and facilitate physical activity behaviour in adolescents' local neighbourhoods.

Educator perceptions of new activity standards for British Columbian child care

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Special Interest Group: F. Early care and education (SIG)

Purpose: With an increasing number of children attending regular childcare services, this setting presents an opportunity to develop physical activity habits and movement skills of children. These health behaviours play an important role in the development and well-being of children. In 2017, a Director of Licensing Standard for Active Play (AP Standard) was introduced in British Columbia, Canada, to mandate practices related to physical activity, sedentary time, screen-time and provision of opportunities to develop movement skills in licensed childcare services. A capacity building initiative including training and on-line resources was released alongside these new guidelines to support educators in implementation. The purpose of this study was to qualitatively examine the barriers and facilitators early learning practitioners faced in implementing the AP standard, and explore the role of the capacity building training and resources.

Methods: Data were collected via semi-structured telephone interviews with educators (n=23), sampled across all five health authorities in British Columbia, Canada. Thematic analysis was used to code and theme the data informed by a theoretical framework of contributions to implementation.

Results: Data were sorted into three major themes with four subcategories of implementation influences in each theme and included: attributes of the standard and capacity-building training (enhanced awareness and knowledge, simplicity, compatibility, and prompting of intention and commitment); characteristics of providers (personal activity level, previous experience, personal philosophy, and role models); and characteristics of childcare settings (infrastructure, schedules, social support, and policies and practices). Educators discussed how each of these three themes directly influenced provision of physical activity opportunities. Educators were overwhelmingly supportive of one of the standards; minimal to zero screen time in childcare. Interestingly, educator responses did not highlight or discussed movement skills.

Conclusions: The guideline and capacity building training which included a strong focus on physical literacy appeared to support implementation of physical activity opportunities, but educators did not articulate specific benefits to movement skill development. Future training should work to engage educators who may not place a high value on movement skills to ensure that provision of physical activity is purposeful and involve development of locomotor, object control, and balancing skills.

Effect of Standing versus Sitting on Executive Functioning and Creativity of Vocational Education and Training Students

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Special Interest Group: L. Other

Research suggests that breaking up sedentary behavior (SB), can positively influence executive functions (EF) and creativity (CREA), as several brain mechanisms are stimulated by light physical activity such as standing. Two out of five adolescents in the Netherlands are enrolled in vocational education and training (VET) education. In general, the SB levels are high in adolescents in VET students. As stimulating EF and CREA is important for their academic performances, our aim is to investigate the effect of breaking up sitting time by standing during class on EF and CREA in VET students. Two randomized controlled cross-over studies were conducted with respectively 165 (EF study; mean age 18.8 years, SD = 7.9) and 192 VET students (CREA study; mean age 18.2 years, SD = 1.7), allocated to either a sitting or standing condition. The students were taught for 15 minutes after which they performed in the EF study the Letter Memory Test and the Color Shape Test, to measure updating, shifting and inhibition, respectively. In the CREA study, the students performed the Guilford's Alternate Uses Test for divergent thinking and the Remote Associates Test for convergent thinking. Subsequently, the conditions were switched and the procedure was repeated after one week in the EF study and immediately in the CREA study.

Mixed model analyses showed no effect of standing on updating ($B = .50$, $SEb = .50$, 95% CI = $-.49$; 1.50), shifting ($B = -10.48$, $SEb = 14.61$, 95% CI = -39.41 ; 18.46), or inhibition scores ($B = 2.31$, $SEb = 10.64$, 95% CI = -18.77 ; 23.39). Neither effects of standing on divergent thinking ($B = -0.06$, $SEb = 0.22$, 95%CI = -0.49 ; 0.38), or convergent thinking ($B = -0.20$, $SEb = 0.15$, 95%CI = -0.56 ; 0.03) were found.

It can be concluded that short-time standing during class has no acute beneficial effect on the EF of VET students, nor on their CREA. Future research should investigate the effect of a more prolonged duration of standing on EF and CREA in VET students.

Effect of the multi-component Healthy High School intervention on meal frequency and eating habits among high school students in Denmark: a cluster randomized controlled trial

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Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: Previous studies have shown that multicomponent interventions could improve meal frequency and eating habits in children, but evidence among young people is limited. This study evaluated the effect of the Healthy High School (HHS) intervention on daily intake of breakfast, lunch, water, fruit, and vegetables at nine-month follow-up.

Methods: The study included first-year students attending high school in Denmark. Participating schools were randomized to the HHS intervention (N=15) or control group (business as usual) (N=15). The HHS intervention included a curriculum, structural and organizational initiatives, a workshop, and a smartphone application, designed to promote well-being by focusing on in example meal frequency and eating habits. Self-administered online questionnaires were filled out by students at the beginning of the schoolyear and nine months later. To account for the clustering of data, multilevel logistic regression analyses was used to estimate odds ratios (OR). We used an intention-to-treat approach with multiple imputation of missing data.

Results: At baseline 4,577 of 5,201 students answered the questionnaire and 4,512 at follow-up. Breakfast frequency decreased notably from baseline to follow-up, lunch frequency decreased only a few percentages. Daily water intake, intake of fresh fruit and intake of vegetables did not change noteworthy from baseline to follow up. We did not find evidence of an effect of the intervention on any of the outcomes: breakfast: OR=0.88 (95% CI: 0.68;1.17), lunch: OR=0.99 (95% CI: 0.78;1.25), water intake: OR=1.16 (95% CI: 0.95;1.41), intake of fresh fruit: (OR=1.09, 95% CI: 0.85;1.39), vegetables: (OR=1.01, 95% CI: 0.78;1.32).

Conclusions: No evidence of an effect of the HHS intervention was found for any of the outcomes. Process evaluation have shown signs of positive changes in food environment at the intervention schools and appreciation of the canteen intervention; however, our outcome measures might not be sensitive enough to show these changes. Furthermore, other intervention elements might have had low implementation and therefore low impact on student behavior. Lastly, the lack of an effect of the intervention, could be due to the lack of involvement of systems outside the school-setting.

Effectiveness of a mobile health intervention aimed at changing lifestyle behaviours in children with overweight and obesity: Findings from the Aim2Be Randomized Controlled Trial

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Special Interest Group: G. Children and families (SIG)

Purpose. Mobile health interventions offer a promising alternative to in-person weight management interventions, but their potential in children with overweight and obesity (OwOb) remains understudied. The Aim2Be app is a gamified app for children and their parents to adopt healthy lifestyle behaviours. This randomized controlled trial aimed to: 1) evaluate the effectiveness of the Aim2Be app plus a virtual live coach (LC) in changing health behaviours among children with OwOb and their parents; 2) assess whether participants exposed to Aim2Be plus LC experienced greater changes in outcomes compared to participants exposed only to Aim2Be (no LC).

Methods. From 2019 to 2020, participants were randomized into an intervention group (Aim2Be with LC for 6 months) or a waitlist control group (Aim2Be with no LC accessed after 3 months). Children's assessments at baseline, 3- and 6-months included measured height and weight, 24-hour dietary recalls, and steps/day measured with a Fitbit. Self-reported physical activity, screen time, fruit and vegetable intake, and sugary beverage intake of children and parents were collected. Mixed-effect models were used to examine 3-month changes in outcomes between the intervention and control groups.

Findings. A total of 214 parent-child dyads (child age 10-17 years) were randomized to the intervention or a control group. No significant differences were observed between groups for any of the outcomes among children or their parents over 3 months. These effects were unchanged when using multiple imputation to account for missing data. Children randomized to Aim2Be with LC reported more time being active outside of school compared to children who used Aim2Be with no LC over 3 months ($P < 0.05$).

Conclusions. No intervention effects in this clinical sample of children and their parents were observed over a 3-month period. The addition of a LC appears to have supported greater physical activity among children. However, these findings should be interpreted with caution as seasonality could be an important factor in explaining these differences. Future studies should explore the potential mediators and predictors of engagement and retention to shed more light onto the results of this evaluation.

Effectiveness of a Smartphone App to Promote Healthy Weight Gain, Diet and Physical Activity During Pregnancy (HealthyMoms): Randomized controlled trial

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Special Interest Group: D. e- & mHealth (SIG)

Background: Excessive gestational weight gain (GWG) is a major public health concern associated with negative health outcomes for mother and child. Digital interventions have the potential to reach many women and promote healthy GWG. Most previous digital intervention studies have been pilot studies and/or have not included women from all BMI-categories. We examined the effectiveness of a smartphone application (app) in 305 pregnant women covering all BMI-categories.

Objective: To investigate the effectiveness of a 6-month intervention (the HealthyMoms app) on GWG (primary outcome), body fatness, dietary habits, moderate-to-vigorous physical activity (MVPA), glycemia and insulin resistance (secondary outcomes) in comparison to standard maternity care.

Methods: A 2-arm parallel randomized controlled trial was conducted. Women were recruited at maternity clinics in Östergötland, Sweden. Women were randomized (1:1 ratio) after completion of baseline measures (intervention, n=152; control, n= 153). The control group received standard maternity care while the intervention group also received the HealthyMoms smartphone app for 6 months. Outcome measures were assessed at baseline (mean 13.9 [SD 0.7] gestational weeks) and follow-up (mean 36.4 [SD 0.4] gestational weeks).

Results: Overall, we found no statistically significant effect on GWG; however, the data indicate that the intervention effect differed by pre-pregnancy BMI, as women with overweight and obesity before pregnancy gained less weight in the intervention group compared to the control group in the imputed analyses (-1.33 kg [95% CI -2.92; 0.26, P=.10]) and completers only analyses (-1.67 kg [95% CI -3.26; -0.09, P=.031]). Bayesian analyses showed a 99% probability of any intervention effect on GWG among women with overweight and obesity, and an 81% probability that this effect was > 1 kg. The intervention group had higher scores for the Swedish Healthy Eating Index at follow-up than the control group (0.27 [95% CI, 0.05 to 0.50], P=.017). No statistically significant differences were observed in the other secondary outcomes.

Conclusions: Although we found no overall effect on GWG, our results demonstrate the potential of a smartphone app (HealthyMoms) to promote healthy dietary behaviors as well as to decrease weight gain in pregnancy in women with overweight and obesity.

Effectiveness of school-based nutrition education program components on FV intake and nutrition knowledge in children aged 4-12 years old: an umbrella review

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Special Interest Group: F. Early care and education (SIG)

Purpose: This review of reviews aims to (1) identify components of primary school-based nutrition education programs and (2) synthesize component effects on fruit and vegetable (FV) consumption and nutrition knowledge in children.

Methods: Systematic reviews and/or meta-analysis were eligible for inclusion if they focussed on school-based interventions in children aged 4-12 years old that reported FV consumption and/or nutrition knowledge in children. Six databases were searched for relevant entries published between 2010 to August 2020 in English language. Two reviewers independently assessed all potential articles. Data extraction included characteristics of included reviews and methodological quality was appraised using the JBI Critical Appraisal Instrument for Systematic Reviews and Research Syntheses. Conflicts were resolved through discussion between the reviewers. Data synthesis involved categorizing the interventions based on their used component and outcomes. The Grading of Recommendations Assessment, Development, and Evaluation (GRADE) approach will be used to assess quality of evidence and if possible, a meta-analysis will be performed to determine the effect on FV intake.

Results/findings: From 547 records that were identified for title and abstract screening, 63 full texts were retrieved for assessment, with 11 reviews included (six systematic reviews, four systematic reviews and meta-analysis and one meta-analysis) that were published between 2011 and 2020. FV intake was reported by most of the reviews (n=8), both FV intake and nutrition knowledge were reported by two reviews and one review reported nutrition knowledge only. The following 10 components were identified for analysis: (1) FV provision (availability and accessibility of FV at school), (2) computer-based, (3) educational/curriculum, (4) environmental change, (5) marketing campaigns, (6) school food policies, (7) family/caregiver involvement, (8) garden-based nutrition education, (9) behavioural change techniques and (10) point-of-purchase labelling.

Conclusions: This umbrella review will provide an overview of all components included in school-based nutrition education programs and its effect on FV intake and nutrition knowledge in children aged 4-12 years old. We expect the findings will contribute to the development of future successful programs and evaluations, and consequently promotes healthy eating behaviour among children.

Effects of a family-based lifestyle and psycho-education program plus a supervised exercise intervention on visceral adipose tissue in children with overweight/obesity: The EFIGRO project

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Special Interest Group: K. Disease prevention and management

Purpose: To examine the effect of a multicomponent intervention program designed according to current paediatric guidelines for childhood obesity and including a family-based lifestyle and psychoeducation program plus a supervised exercise intervention on visceral adipose tissue (VAT) in children with overweight/obesity.

Methods: In this two-arm, non-randomized, parallel design clinical trial (Clinical Trial registration:NCT02258126), participated 101 children with overweight/obesity aged 8-12 years. Children were allocated to either a 22-week lifestyle and psychoeducation program (control group, n = 52) or to the same program plus a supervised exercise intervention (intensive group, n = 49). The control group received two monthly sessions of a family-based lifestyle and psychoeducational program. The intensive group received the same intervention than the control group plus three weekly sessions of supervised exercise including both cardiovascular endurance and strength training at moderate-to-vigorous intensity. The primary outcome was the change in VAT (measured by magnetic resonance imaging) between baseline and post-intervention period. Further, we additionally explore whether cardiorespiratory fitness (measured by maximal treadmill test) mediates the changes in VAT.

Results/findings: Both groups significantly reduced VAT at the end of the intervention (all $p < 0.002$), yet the reduction was significantly greater in the intensive group compared to the control group (percentage of change = - 18.1% vs. - 8.5%, $p < 0.001$, mean difference - 4.2 cm², $p = 0.010$; d-Cohen = 0.51). Indeed, the percentage of children with a clinically significant VAT reduction from baseline to post-intervention (i.e., d-Cohen ≥ 0.2) was two times higher in the intensive group compared to the control group (73.5% vs. 36.5%, $p < 0.001$). The change in cardiorespiratory fitness has a mediation role on the effect of the intervention on VAT (indirect effect: $\beta = -0.057$, 95% confidence interval = -0.139, -0.004).

Conclusions: A multicomponent intervention program that includes lifestyle and psychoeducation plus supervised exercise reduces VAT content in children with overweight/obesity, which might be mediated by changes in cardiorespiratory fitness. Therefore, intervention programs aiming to target paediatric obesity should focus not only on reducing fatness but also on improving fitness.

Effects of Pokémon Go on Physical Activity and Health Outcomes: A Systematic Review

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Special Interest Group: D. e- & mHealth (SIG)

Background: Augmented reality mobile game, Pokémon Go, leverages gamification and location tracking technology to encourage players to walk in different places to catch Pokémon characters in real-world settings. The systematic review sought to explore the impact Pokémon Go has on players' physical activity, psychosocial and cognitive outcomes.

Methods: Six research databases (PubMed, SPORTDiscus, PsycInfo, Web of Science, Science Direct, and Scopus) were used to initially identify 400 articles published between July 2016 and December 2020. Databases were searched with the key terms used in combination: "Pokémon Go" AND "physical activity" OR "psychological" OR "cognitive". The following inclusion criteria were used for each study: (1) published in English as peer-reviewed empirical research between 2016 and 2020; 2) conducted quantitative research; 3) examined the relationships between or impact of Pokémon Go on any of the following outcomes: physical activity, psychological, and cognitive outcomes; and 4) included participants played or exposed to Pokémon Go.

Results: Thirty-one studies were included for the final analysis, with a total sample of 36,840 participants. Players had significantly greater physical activity than non-players in terms of daily steps, number of days spent in moderate physical activity and distance walked. Pokémon Go increased physical activity levels among obese and inactive people. Pokémon Go game also improved psychosocial well-being by increasing player's social interactions and improving their affect, anxiety and psychological distress. Selective attention and concentration levels in youth improved after 10 weeks of Pokémon Go intervention.

Conclusions: Findings indicate that Pokémon Go was associated with increased light PA and walking, improved mood and social interaction, and some aspects of cognitive ability including memory, attention and concentration. However, future studies with rigorous study design, as well as validated and homogeneous outcome measures, are needed to confirm the findings and explore ways to improve the game's current incapability for players' long-term engagement and higher intensity PA.

Elucidating how Physical Activity and Sleep relate to Optimal Cognitive Ageing: the PASOCA-study protocol

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Special Interest Group: A. Ageing (SIG)

Purpose: Increased longevity is one of the greatest success stories in public health. However, ageing is accompanied by cognitive decline which affects people's daily functioning and, if it develops to dementia, their ability to live independently. The aim of the PASOCA study is to precisely examine how physical activity (PA) and sleep, both modifiable lifestyle factors, are related to cognition and which role they can play in optimal cognitive ageing.

Methods: This is an observational longitudinal study spanning over three years. Objective and subjective data of healthy, community dwelling adults aged 55 years and above (n=220) will be collected once a year. Participants will wear ActiGraph's wGT3X-BT on the wrist of their non-dominant hand for 7 consecutive days and nights in order to objectively capture PA, sedentary behaviour and sleep. In addition, the International PA Questionnaire Short Form, a muscle-strengthening exercise survey and the Pittsburgh Sleep Quality Index will be administered to gather subjective input on PA and sleep. Cognition (executive function and memory) will be tested with the CANTAB test battery. Data will be analysed using multiple linear regressions with cognitive function as dependent variable and PA and sleep as independent variables, controlled for potential covariates such as socio-demographic factors, health behaviours and depressive symptoms. Furthermore, associations between combinations of 24-hour activity and sleep data with cognitive function will be examined with Compositional Data Analysis.

Results: This study will meet the current need for longitudinal studies with objective PA and sleep data, as well as provide, for the first time, in-depth information on associations of type of PA (aerobic vs muscle strengthening), characteristics of sleep (quality vs quantity) with specific cognitive domains (executive function and memory). Moreover, we will consider these behaviours within the 24-hour day.

Conclusions: The resulting deeper understanding of the precise relationship between PA, sleep and cognitive function will contribute to the development of preventive interventions for maintaining cognitive health at older age.

Enablers and barriers to girls' participation in male-dominated action sports. A qualitative study

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Special Interest Group: G. Children and families (SIG)

Purpose: To improve opportunities for girls to be physically active by determining the enablers and barriers to girls' engagement in male dominated action sports

Methods: Twenty-eight young (12-18 years) Australian mountain-biking, skateboarding or surfing participants or enthusiasts- (n=17 boys; 11 girls) and 20 Australian adults (n=8 parents; 12 stakeholders - board/committee members, chief executive officers, coaches, officials, event coordinators in either action sport) shared their perspectives on the enablers and barriers to girls' engagement in the aforementioned sports. Data were collected through telephone interviews with young people and focus groups with adults in a blended face-to-face/video conferencing format which were audio-recorded, transcribed verbatim and analysed thematically.

Results/findings: From a social-ecological perspective enablers and barriers discussed were at the individual, social and environmental level. Common barriers raised by adults and young people included: gender stereotypes, "...boys love bikes and girls love dolls..." or sexism (e.g. clothing/equipment primarily designed for boys, unequal prize money favouring males), friends/family not engaged in the sport and limited access to the requisite environments or equipment. Adults said the absence of skill development pathways for girls, no toilets/change-rooms, "...girls with periods need toilets" and a focus on competition over participation were other barriers. Parents and girls said lack of visibility of girls playing sport in the media and self-consciousness were reasons for lower participation by girls. Common enablers discussed included initiatives that promote inclusivity (e.g. non-competitive events, infrastructure for all skill levels, access to equipment), fostering social connections (e.g. engage friends/families), developing/expanding all girls events/programs/coaching/clubs/groups, skill development pathways enabling life-long engagement (including becoming coaches, equipment maintenance), school based programs/events for all skill levels. Normalising girls' participation through improved promotion (e.g. through media) and growing and promoting female action sport role models were other common enablers.

Conclusions: Girls face barriers to participating in action sports not experienced by boys. Many barriers are social and can be remediated with minimal resource input. Removing barriers to girls' engagement in action sports may provide untapped opportunity to correct lower levels of physical activity amongst girls compared with boys.

Engagement with, and Efficacy, of a Self-Monitoring Mobile Health Intervention to Reduce Sedentary Behavior in Belgian Older Adults: Mixed Methods Study

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Special Interest Group: A. Ageing (SIG)

Purpose: Previous studies suggest that self-monitoring might be a promising behavior change technique to reduce older adults' sedentary behavior (SB). However, little is known about self-monitoring interventions aimed at the reduction of older adults' SB. The aim of this study is to evaluate engagement with, and efficacy of a self-monitoring-based mHealth intervention developed to reduce older adults' SB.

Methods: A mixed methods study was performed among 28 community-dwelling older adults living in Belgium. The 3-week self-monitoring intervention consisted of general SB information as well as visual and tactile feedback (ie vibrations) on participants' SB. Semi-structured interviews were conducted, and system usage data were recorded, to explore engagement with the intervention. Accelerometer data from the self-monitoring device and from the ActivPAL accelerometer were analyzed to assess the interventions' efficacy. Qualitative data were thematically analyzed and presented using pen profiles; quantitative data were analyzed using descriptive statistics, and generalized estimating equations.

Results/findings: Participants mainly reported positive feelings regarding the intervention, referring to it as motivating, surprising, and interesting. They commonly reported that the intervention changed their thinking, but not their actual behavior. The intervention was considered easy to use, and the design was described as clear. Some problems were noticed regarding attaching and wearing the self-monitoring device. System usage data showed that the median frequency of consulting the app widely differed among participants. A total of 2601 vibrations were provided to the participants during the intervention period. Fourteen, twenty-one, and twenty-eight percent of the vibrations resulted in a sedentary behavior break respectively within one, three and five minutes. The percentage of sedentary behavior breaks was significantly higher if haptic feedback was provided in the afternoon, compared to the morning. No significant reductions were found in total sitting time after the intervention.

Conclusions: Although the intervention was well perceived by the majority of older adults, the number of SB breaks was limited, and total sitting time did not reduce. Possible explanations for the lack of reductions might be the short intervention duration or the fact that only bringing the habitual SB into conscious awareness might not be sufficient to achieve behavior change.

Evaluating the Statewide Dissemination of A School-Based Physical Activity Curriculum

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Special Interest Group: G. Children and families (SIG)

Purpose: Beginning in 2011, the University of New Mexico Prevention Research Center (UNM PRC) began implementing Child Health Initiative for Lifelong Eating and Exercise (CHILE) Plus, as an evidence-based and multilevel obesity prevention program among American Indian and Hispanic children enrolled in Head Start (HS) programs across rural New Mexico. As the dissemination of the original CHILE intervention study funded by NIDDK, CHILE Plus aims to help young children eat more healthy food and participate in more physical activity (PA). The objective of this study is to report eight years (2011 to 2019) PA outcome (i.e., add at least 30 mins of structured PA to daily class activities) from this statewide initiative.

Methods: As one of six CHILE Plus intervention components, HS teachers are provided with well-designed PA curriculum, the necessary tools, equipment, and lessons needed to incorporate an additional 30 mins of PA per day into classroom time. Most activities are short in duration (5 to 10 mins), require little space, and use a minimum amount of equipment. Children's PA (i.e., mins spent in structured PA) at school are reported by HS teachers daily. Descriptive statistics were calculated and presented as mean \pm standard deviation.

Results: A total of 8150 children from 16 school districts have valid PA data. Overall, children spent 49.95 ± 25.89 mins in daily structure PA at school. Specifically, children ($n = 316$) from two school districts had more than 70 mins PA (75.28 ± 34.72); children ($n = 5896$) from seven school districts participated in PA between 50 and 60 mins (55.33 ± 29.72); children ($n = 1753$) from six school districts spent 30-40 mins in PA (36.36 ± 13.78); and children ($n = 185$) from one school district engaged less than intended 30 mins structured PA (20.69 ± 15.26).

Conclusions: Overall, intended gains in additional 30 mins daily structured PA were made for most implementing agencies. The assessment of the implementation and maintenance showed the potential of the CHILE Plus program for high public health impact among New Mexico HS children. This initiative should continue to be applied across a wider range of school-based programs and populations.

Evaluation of a lifestyle intervention among participants of the French colorectal cancer screening program

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Special Interest Group: C. Cancer prevention and management (SIG)

Purpose: Our overall goal is to evaluate the impact of promoting diet and lifestyle recommendations at colorectal cancer (CRC) screening among individuals at higher risk of developing CRC. We aim at evaluating the impact of the intervention on changes in their adherence to these cancer prevention recommendations. In addition, aim to evaluate changes in patients' risk perception and knowledge about lifestyle behaviours that may prevent CRC, as well as changes in their automaticity of target behaviours over the trial period. Finally, this study also aims to evaluate the impact of the intervention on physical fitness, body size, metabolic health and biomarkers of CRC development.

Methods: This study is a parallel, two-arm, cluster, randomised controlled trial (RCT) in individuals at higher risk of CRC, comparing an evidence-based diet and lifestyle advice intervention with 'usual care'. The lifestyle recommendations provided are developed based on the latest evidence-based diet and lifestyle recommendations and will be delivered using multiple materials (e.g. leaflets, posters and digital information) by health professionals in hospitals based in the Rhone region, France. Information on how to transform these recommended behaviours into habits, and therefore render them easier to maintain over time, is also provided, as well as concrete examples and tips for healthy lifestyle behaviours (e.g. healthy recipes, examples of convenient exercises for the target group, etc.). Individuals receive the intervention material during their hospital visit before colonoscopy, with a refreshment intervention during their medical visit after their colonoscopy and a further follow-up for 12 months.

Results/findings: The proposed study is expected to promote a greater improvement in diet and lifestyle behaviours, as well as improvement in quality of life, biomarkers for cancer risk, physical fitness and body weight among individuals at higher risk of developing CRC.

Conclusions: Providing lifestyle advice for cancer prevention at screening programs is a new field in public health that has the potential to be cost-effective, convenient, appealing and wide-reaching. It may also help to reach individuals at higher risk at a time-window when they are more receptive to advice on healthy lifestyles and more likely to make the required behavioural changes.

Examining food intake similarities in adolescent best friend dyads using Actor-Partner Interdependence Models

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Special Interest Group: L. Other

Purpose: The social environment is a key determinant of our food intake. In adolescence, friends are particularly important socializing agents within this environment. This study aims to assess whether similarities exist in (un)healthy food intake in adolescent best friend dyads. Innovatively, we will examine if adolescents initiate friendships with friends who report similar food intake (selection) and/or if adolescents are influenced by their friend's food intake (socialization). Additionally, we will examine if zBMI moderates friend socialization involving food intake.

Methods: We analyze two waves of data from Dutch secondary school students participating in the "G(F)OOD together!" research project, which were collected six months apart in the same school year. We identify pairs of adolescents who nominated each other as best friends – a "reciprocated friendship dyad" – either at both waves (enduring friendship dyad) or at the second wave only (new friendship dyad). We use both dyad member's self-reports on healthy (fruit and vegetables) and unhealthy (SSBs, sweet snacks, savory snacks) food intake as measured by food frequency questionnaires. Both dyad members are also distinguished based on their zBMI (based on objective height and weight). To adequately handle dependencies in the data, we employ longitudinal Actor-Partner Interdependence Models (APIMs).

Results/findings: We are currently pre-registering our analysis plan on the Open Science Framework. We plan to estimate APIMs using Structural Equation Modeling in R (lavaan), separately for each dyad type (new and enduring) and type of food intake. To identify selection effects, we will examine similarity in the levels of food intake at wave 1 between dyad members in new friendship dyads. Moreover, to detect socialization effects, we focus on enduring friendship dyads, and test if the effect of one dyad member's food intake at wave 1 predicts the other member's food intake at wave 2 (partner effect). Lastly, to examine the moderating role of zBMI in friend socialization involving food intake, we will test whether the magnitude of partner effects differs between the lower and the higher zBMI friend in enduring dyads.

Conclusions: This study will improve our understanding of the dyadic patterns of food intake in adolescent best friends.

Examining parent stress and child schooling/care location as predictors of restaurant-related behaviors during the COVID-19 pandemic: Findings from a nationally representative survey

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Special Interest Group: G. Children and families (SIG)

Purpose: Emerging evidence highlights impacts of the COVID-19 pandemic on U.S. families, including lifestyle changes (employment, school), increased stress, and changes in eating behavior. Prior to COVID-19, parental stress has been linked with child eating behavior, including frequent fast-food consumption, which is associated with poorer diet quality. Aims of the present study were to examine whether parent stress and at home vs. out-of-home childcare/school predicted families' restaurant-related behaviors during COVID-19.

Methods: An online survey was administered to a nationally representative sample of U.S. parents with a 4-to-8-year-old child in October 2020 (n=1000). Linear and logistic regression were used to examine whether parent stress (from the validated 4-item Perceived Stress Scale) and at home vs. out-of-home childcare/school predicted: 1) the frequency the child consumed restaurant meals (take-out, delivery, dine-in), 2) who chose the child's restaurant meal, and 3) parent-reported reasons for the child's meal choice. Income, education, employment, race/ethnicity and regional COVID-19-related restrictions were tested as covariates, with sampling weights incorporated in all analyses.

Results: Parents who reported that their children were receiving care or attending school at home rated nutrition as more important when rank ordering reasons for selecting the child's restaurant meal compared to those with children attending school or childcare outside of the home (for delivery p=0.006; for dine-in p=0.022). Parents with higher stress rated children's liking as a less important reason for child restaurant meal selection (for take-out p=0.001; for delivery p=0.018) compared to parents with lower stress. Generally, sociodemographics predicted more variability in restaurant-related behaviors than childcare/school status or stress (e.g., higher-income and employed parents reported higher frequency of children dining at restaurants). Parents reporting more COVID-19 restrictions rated child liking as more important (p=0.017) and habit as less important (p=0.019) reasons for child meal selection.

Conclusions: It is important to understand factors predicting variability in health-related behaviors as the COVID-19 pandemic continues. We observed sociodemographic differences in families' restaurant-related behaviors, and reasons behind the selection of children's restaurant meals also varied by parent stress, child schooling/care location, and

COVID-19 restrictions. Continued research in these areas could inform the focus of healthy eating interventions during COVID-19.

Examining the relationship of maternal employment with weight-status and health-related behaviors among racially/ethnically diverse children

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Special Interest Group: G. Children and families (SIG)

Purpose: Although obesity has a multifactorial etiology, a concomitant rise in maternal employment has been suggested as an important factor in the prevalence of childhood obesity. This study investigated the association of maternal employment with children's weight status and weight-related behaviors in a sample of racially/ethnically diverse parent-child dyads.

Methods: Cross-sectional study conducted among 136 mothers (aged 34 ± 6.8 yrs) of children (aged 6.4 ± 0.8 yrs; 48% girls) from six racial/ethnic groups (18% African American, 18% American Indian, 17% Hispanic/Latinx, 15% Hmong, 17% Somali, 15% White). Mothers answered survey questions about their employment status and completed three 24-h dietary recalls using the Nutrition Data System for Research (NDSR) to report child dietary intake. Children wore a hip-mounted accelerometer for eight days to measure sedentary time and moderate-vigorous physical activity (MVPA). Adjusted logistic regression models evaluated the association between maternal employment and child weight status (overweight [BMI percentile ≥ 85 and < 95], obese [BMI percentile ≥ 95]). Adjusted linear regressions evaluated the association between maternal employment and child sedentary time, MVPA, and aspects of dietary intake.

Results: Four categories of maternal employment status were identified: stay-at-home caregiver (17%), working part-time (23%), working full-time (41%), and unemployed/out of the labor force (19%). The average predicted probability that children were overweight or obese if mothers were unemployed was 73% and 40%, respectively. The probability that children were overweight or obese if mothers were stay-at-home caregivers was 44% and 28%, whereas if mothers were employed, it was between 42%-48% and 28%-29%, respectively. Consistent with these findings, higher mean intake of total calories, solid and saturated fats, and added sugars were observed for children whose mothers were unemployed relative to children in other categories of maternal employment. Similar sedentary time and MVPA, sodium intake, and overall diet quality across categories of maternal employment were observed.

Conclusions: In contrast to previous studies, we found that children of employed mothers had similar weight status and weight-related behaviors to stay-at-home mothers. However, these findings highlight that dietary interventions for the children of unemployed/out of the labor force mothers may be important.

Exploring qualities of ethnically diverse parents associated with healthy home food and activity environment of toddlers

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Special Interest Group: G. Children and families (SIG)

Purpose: The home environment and parents' roles have received much attention in early childhood obesity prevention research. However, the possible reciprocal relationship between environment and the parent is seldom addressed. This is critical because parents with certain parenting styles, feeding practices, and weight status may need additional support creating home environments that facilitate children's health behaviors. Therefore, this study aimed to describe parental qualities associated with healthy home food and activity environment of children.

Methods: This cross-sectional study utilized baseline data from a randomized control pilot study of a wellness program, which included a sample of 50 ethnically diverse parents (84% mothers, Mage = 31.7 years) and their toddler age child (12-36 months). Parental BMI was calculated via self-reported weight and height data. Parents completed the Comprehensive General Parenting Questionnaire (van der Horst and Sleddens 2017) and Structure and Control in Parent Feeding (Savage et al. 2017) questionnaire. Health behavior resources, barriers, social norms, and policies in the home were assessed using the Healthy Home Survey (Bryant et al. 2008), the Home Food Inventory (Fulkerson et al. 2008), the Sleep Environment Questionnaire (Wilson et al. 2014), and items developed for this study. To calculate one home environment composite score, scores on all home environment items were standardized and then summed. Items related to obesogenic behaviors were reverse scored; therefore, a higher score would represent a healthier home environment. Pearson's correlations tested associations between parental qualities and healthy home environment.

Results: Most parents were Hispanic/Latino (38%), and African American (32%), and their mean BMI was 28.4 kg/m². Parental BMI ($r=-0.306$; $p=0.032$) and coercive control ($r=-0.333$; $p=0.022$) were inversely correlated with healthy home environment. Parental use of structure in general parenting and in feeding practice were related to overall home environment ($r=0.336$; $p=0.026$) and home food environment scores ($r=0.415$; $p=0.003$), respectively.

Conclusions: Preliminary evidence suggests that parents, who provide clear and consistent communication regarding expectations, set age-appropriate limits, avoid pressure to control their children's behaviors, and have a lower weight status, live in a home environment that supports their children's healthy eating, activity, and sleep behaviors development.

Exploring sedentary behaviour among doctors working in General Practice in the United Kingdom

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Special Interest Group: K. Disease prevention and management

Purpose: Excessive sedentary behaviour is associated with a number of adverse health outcomes and increased all-cause mortality. General Practitioners (GPs) are at the coalface of the UK National Health Service (NHS), with unique opportunities for the promotion of healthy lifestyles. GPs who are more physically active are more likely to recommend physical activity to their patients. This study gained quantitative data on levels of sedentary behaviour among General Practitioners working in the UK NHS.

Methods: A multi-item sedentary behaviour questionnaire survey was disseminated to GPs working in the UK NHS in Northern Ireland. Subsequently, a purposive, maximally varied sample of 20 participants were recruited to wear thigh-worn accelerometers and complete a sleep/work log. This allowed comparison of subjective, self-reported data with objective, accelerometer data.

Results: Out of 1999 GPs in Northern Ireland, the questionnaire received 352 valid responses (response rate of 18%). Overall mean workday sedentary time for GPs was 10 hours 20 minutes. Overall mean non-workday sedentary time was 4 hrs 47 minutes. Only 6% of GPs had access to an active workstation, such as a sit-stand desk. 86% of those who didn't have an active workstation would consider using one. GPs who would not consider using an active workstation were older than those who would consider using one (45 vs 40 years). Those that had access to an active workstation had an overall mean workday sedentary time of 7 hours 53 mins. Those that did not have access to an active workstation had an overall mean workday sedentary time of 10 hours 28 mins. This was a statistically significant difference of 2 hours 35 mins ($t = 3.459$; $p = 0.001$). 81% of GPs reported they are spending more time sitting in work now than prior to the COVID-19 pandemic. 87% of GPs would prefer less time sitting in work.

Conclusions: Sedentary behaviour among GPs has increased since the onset of the COVID-19 pandemic, with the vast majority of GPs exceeding the recommended daily levels of sedentary behaviour. Further research is therefore required to identify ways of reducing sedentary behaviour and increase physical activity among GPs.

Facilitators and Barriers to Healthy Dietary Intake in Adults with Type 2 Diabetes in Kenya: A Qualitative Study

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Special Interest Group: K. Disease prevention and management

Purpose: This study aimed to explore the barriers and facilitators to dietary intake in adults with type 2 diabetes in Kenya. It is estimated that 2.2% of the adult population in Kenya have diabetes and nearly two-thirds of the adults have undiagnosed diabetes. Diabetes is associated with all-cause mortality, cardiovascular diseases and causes heavy economic burdens. Various components of dietary behavior and the food environment are probable facilitators and barriers to type 2 diabetes. However, there is little information on the specific drivers of the disease in Kenya.

Methods: Adult participants aged 20 to 65 years old, with type 2 diabetes mellitus were purposively selected from six hospitals based on their ability openly elucidate on the theme of dietary intake. A semi-structured questionnaire developed through a theoretical framework was administered through telephone interviews conducted in Swahili or English. Telephone interviews were selected as a safe approach during the COVID 19 crisis. After transcription and translation, NVivo 12 Software was used to code the responses from each question. Inductive thematic analysis was used to identify the highest ranking facilitators and barriers to dietary intake.

Results/findings: Thirty interviews were conducted, each lasting between 27-47 minutes. The four highest ranking facilitators to healthy dietary intake were knowledge on the benefits of various foods, owning kitchen gardens or farms, family support, and nutrition education provided by healthcare workers. Three highest ranking barriers included lack of reliable sources of information on healthy food choices and practices, unsupportive families and socio-economic factors.

Conclusions: Access to knowledge on food and dietary practices, which is a components of food literacy was identified as a leading and modifiable facilitator and barrier to healthy dietary intake. Innovative and context-specific interventions to facilitate food literacy have the potential to sustainably improve treatment outcomes for adults with type 2 diabetes in Kenya.

Facilitators and barriers to providing culinary nutrition education and behaviour change support in usual practice: A survey of Australian health and education professionals

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Special Interest Group: L. Other

Purpose: Programs to better equip health professionals with the knowledge and skills to provide culinary nutrition education and behaviour change support to their patients and clients, as well as improving their own diet-related health practices are emerging. Programs are commonly limited to health and medical trainees. However, culinary and nutrition education professionals could also provide culinary nutrition education and behaviour change support to their students. This research aimed to examine the facilitators and barriers encountered by health and education professionals in providing culinary nutrition education and health behavior support in usual practice; and to identify their continuing professional development (CPD) needs in this domain.

Methods: An Australia wide online survey of health, community nutrition, adult nutrition or culinary education professionals was conducted. The survey included items on socio-demographic characteristics, nutrition knowledge, cooking and food skills confidence, fruit and vegetable intake and CPD needs. Descriptive statistics were used to summarise results.

Results: There were 279 (81% health, 10% adult education 9% community education) responses. Highest cooking skills confidence scores reported were chopping, mixing and stirring food (5.6 (SD=1.6)) while lowest cooking skills confidence scores reported were making sauces and gravy from scratch (4.7 (SD=1.9)). Highest food skills confidence scores reported were reading best before date on food (5.5 (SD=1.6)) while lowest food skills confidence scores reported were using vegetables as snacks (4.6 (SD=1.9)). Highest fruit and vegetable intake and variety scores were recorded in adult education professionals. Highest nutrition knowledge scores were recorded in health and community education professionals. Gaps in knowledge were noted as the greatest modifiable barrier to providing nutrition education; food preparation and cooking education; food skills education; and behaviour change support. Of participants likely/somewhat likely to participate in a culinary nutrition CPD program (65%) the most commonly requested nutrition topics were understanding differences between special diets and 'fad' diets (n= 92, 17%) followed by goal setting for healthy eating (n=94, 17%).

Conclusions: The current survey identified that health and education professionals are interested in CPD to enhance their knowledge of culinary nutrition education and behaviour change support, and highlighted specific areas where education could be targeted.

Factors associated with preschool children's milk consumption

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Special Interest Group: G. Children and families (SIG)

Background: Adequate calcium intake in childhood is essential in optimising peak bone mass. Dairy products are an important source of calcium, however, children's milk consumption has reduced over the past decade in developed countries. As food preferences developed in early life can persist into adulthood, intervening before school age may be effective in improving milk consumption further into childhood and adolescence. There is a paucity of literature examining the factors determining milk consumption, specifically in preschool-aged children, and a lack of dietary interventions targeting milk consumption alone.

Aim: To explore the factors influencing milk consumption among preschool-aged children.

Methods: Questionnaires were completed by parents of 2-5 year-old children as part of a pilot intervention aiming to increase milk consumption in 12 preschools. Chi-square and logistic regression were used to examine the association between children's milk consumption and child and parent-related factors including socio-demographics, milk availability and attitudes. The factors identified were retrospectively applied to components of the Capability, Opportunity, and Motivation Model of Behaviour (COM-B model).

Results: There was an 82% (n=330) response rate and questionnaire responses from 319 parents of 2-5 year-old children (50.5% male, 49.5% female) were analysed. Eighty percent of children and 57% of parents were daily milk consumers. Factors associated with milk consumption were mapped to the following COM-B components: Automatic motivation: Children were more likely to be daily milk consumers if they liked milk (OR=2.86; CI=1.05, 5.10). Social opportunity: Children were more likely to consume milk if their parents also consumed milk daily (OR=5.196; CI=2.33, 11.57). Psychological capability: Children's milk consumption was negatively associated with parents' belief that it is difficult to encourage their child to drink milk (OR = 0.245; CI=0.08, 0.68). Additionally, fruit and vegetable consumption was identified as an associated healthy eating behaviour. Children were more likely to be daily consumers of milk if they were daily consumers of both fruit and vegetables (OR=2.31 CI=1.06, 5.01).

Conclusions: The factors identified are potential targets for future interventions promoting milk consumption among preschool children. Specifically, social opportunity in the form of parents' influence should be a key consideration when designing preschool nutrition interventions.

Factors related to sedentary behaviour and physical activity in call centres during the COVID-19 pandemic

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Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: Contact centres have been identified as workplaces with high levels of sedentary behaviour and one in four members of staff regularly experience musculoskeletal problems. Stand Up for Health (SUH) is an intervention developed based on the socio-ecological model to target sedentary behaviour in contact centres.

The COVID-19 pandemic has changed the way contact centres work, with employees working from home, and restrictions and hygiene measures in place on site. Contact centres now face different barriers and enablers to reducing sedentary behaviour and increasing physical activity. This study explores these factors with the view of refining the SUH programme theory and adapting the intervention accordingly.

The aim of the study is to identify modifiable factors that would influence physical activity and sedentary behaviour during the COVID-19 pandemic among contact centre employees in the UK.

Methods: 64 interviews were conducted across 4 UK contact centres. An interview topic guide was developed to understand current barriers and enablers to sedentary behaviour and physical activity based on the socioecological model. Deductive coding was carried out using a codebook created by the analysis team, and thematic analysis is being used to identify themes in a sample of 33 transcripts.

Results/findings: Analysis is in progress. Many staff felt they were sitting more, moving less and had poorer mental health since the UK-wide lockdown. Reduced social interaction, lack of motivation, anxieties related to COVID-19 and general lockdown restrictions presented significant barriers to physical activity. Barriers to sedentary behaviour included reductions in incidental movement while working (eg. meetings, chatting to colleagues) as well as a general lack of opportunities and need to leave the desk space (whether in office or at home). Working from home proved beneficial for some, who noted the ability to break up sitting by completing housework on breaks and spending more time with family (including being physically active).

Conclusions: This study will provide learnings on the barriers and enablers to sedentary behaviour and physical activity in this complex work and research environment of contact centres, during a time when working practices are shifting significantly.

Family and sociodemographic disparities in physical activity within African American girls

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Special Interest Group: I. Socio-economic inequalities (SIG)

Purpose: Physical activity (PA) disparities focus on moderate-vigorous (MV) PA across racial/ethnic groups. Little is known regarding disparities in 24-hr compositional data within single minority groups, despite the potential to influence health outcomes. Research questions: How do sleep, sedentary and PA behaviors vary in a 24hr-day among African-American (AA) girls? What are the effects of family, socioeconomic, and environmental factors?

Methods: Butterfly Girls is a randomized trial promoting healthy diet and PA among 8-10 year old AA girls in Houston TX (n=390). Seven days PA data (accelerometry) were used (criteria: >1000 min wear time, >600 min awake per day (d)). Baseline outcomes (sleep, sedentary, light, MVPA min/d) were converted to percent of 24-hrs. Factors at the level of family (number of children/adults in home, times family eats together, child eats at restaurants/fast food), sociodemographics (parental education, income, free/reduced lunch), and environment (transportation to school, TV in child's bedroom, hrs/d media use, PA parenting practices (PAPP)) were examined using Kruskal-Wallis test or correlations. Multivariate regression (MANOVA) controlling for wear time explored which factor concurrently influences all PA outcomes.

Results: Daily wear time was 23.6±0.5 hrs. Average days worn was 6.9±0.3. On average, 2.1% of 24-hr was spent in MVPA, 28.7% sleep, 29.8% sedentary, and 30.1% light PA. Cronbach's-alpha for PAPPs ranged from 0.52-0.88 for discouraging practices and 0.83-0.88 for encouraging practices. Correlations of PA with media use and PAPPs were low. PA differences (P<0.05) were observed by income (light PA: <\$21,000 29.5%, \$21-\$61,000 30.8%, >\$61,000 29.5%; MVPA: 1.8%, 2.1%, 2.3%); free/reduced lunch (MVPA: free 1.9%, reduced 2.3%, full 2.4%), education (light PA: < high school (HS) 25%, HS 31%, college 31%, > college 29%; similar trend for MVPA (P=0.06)). MANOVA indicated that number of days child eats at restaurants/fast food (P<0.05), education (P<0.1) influence all PA outcomes.

Conclusions: Disparities were identified by income, education, free/reduced lunch, and restaurant/fast food use. Methods examining PA behaviors concurrently reveal different associations. This research addresses PA and sleep behaviors considering 24-hrs among AA girls who experience greater risk for obesity, and provides support for targeted within-group interventions promoting equity in PA behaviors.

Family dog ownership, dog walking and dog play associated with increased pre-schooler physical activity

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Special Interest Group: F. Early care and education (SIG)

Purpose: Childhood obesity and physical inactivity are major public health issues. Almost every second household in Australia has a dog. Dog ownership leads to greater physical activity in adults and school-aged children. We examined if dog ownership and dog-facilitated physical activity was associated with higher physical activity in young pre-school aged children.

Methods: A secondary data analysis of the 'Play Spaces & Environments for Children's Physical Activity' (PLAYCE) study cohort (2015-2018) was undertaken. Data was collected for 1490 children 2-5 years from 122 long day-care centres in Perth, Western Australia. Parent-report surveys measured socio-demographic factors, dog ownership, child-dog play and dog walking, structured and unstructured physical activity and sedentary screen time.

Results/findings: Compared with non-dog owners, dog-owning pre-schoolers did 8 times/week more unstructured physical activity, but 5 minutes/day less park play (all $p < 0.01$). Within the dog-owning sub-sample, pre-schoolers who played with their dog 3 or more times/week did 12 times/week more unstructured physical activity, 0.5 times/week more structured physical activity, 31 minutes/day more home yard play and 8 minutes/day more park play (all $p < 0.05$). Pre-schoolers who walked their dog three or more times/week did 10 times/week more unstructured physical activity, 0.5 times/week more structured physical activity, 10 minutes/day more home yard play and 21 minutes/day more park play (all $p < 0.05$). Pre-schoolers walking with their dog three or more times/week had 17 mins/week less sedentary screen time ($p = 0.003$).

Conclusions: Family dog ownership is associated with more unstructured physical activity but less park play in preschoolers. Dog-owning preschoolers who play and walk with their dog regularly, have higher levels of outdoor play (at home, in the park and overall), unstructured and structured physical activity, and lower levels of screen time, compared with dog-owning preschoolers who engage in little dog play and walking. Dog play and dog walking may be viable strategies for increasing pre-schoolers' physical activity levels and should be considered in future multi-level interventions to improve children's physical activity.

Family Matters: Social Support and Physical Activity Habits in Female College Students of Lower SES

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Special Interest Group: G. Children and families (SIG)

Introduction: Social support is an important tool for increased physical activity (PA; Casey et al., 2009). The type of supporter (friend versus family member) may particularly influence the amount of PA depending on socioeconomic status (SES). This study explored the differential impact of family and friend support on PA in female college students from poor, low-income, middle-income, and high-income backgrounds. A positive relationship between family support and PA was predicted, with family support strongly predicting PA for students from lower SES backgrounds.

Methods: The study sample consisted of 150 female undergraduate students (ages 18-24; 51% identified as White, 11% as Black, 15% as Latino, 14% as Asian, and 9% as Other). Participants completed self-report questionnaires regarding their PA habits, supportive social relationships, and life stress. Social support was measured using The Social Support and Exercise survey. Family's approximate income level was used to measure SES.

Results: Moderated regression analyses were used to examine the influence of SES on the association between family and friend support and PA. The overall model was significant ($R^2 = .39$, $F(8, 112) = 8.13$, $p < .001$). SES moderated the impact of both family support ($\beta = -1.4$, $p < .01$) and friend support ($\beta = .84$, $p < .01$) on PA. Correlations between family and friend support and PA were examined separately between each income group to assist the interpretation of interaction terms. In the lowest income group, family support and PA were positively correlated ($r(14) = .72$, $p < .01$). In the middle-income group, both family support and friend support were positively correlated ($p < .05$) and ($r(80) = .32$, $p < .01$), respectively. In the highest income group, neither family nor friend support was significantly correlated with PA.

Discussion: Family support is related to PA in lower income, but not high-income groups and that friend support is only related to PA in middle income students. Therefore, the role of family may be especially motivating for PA engagement in individuals with lower SES which has important physical health implications. Additional findings with social-cognitive correlates of family and friend support will be discussed.

Feeding Practices in Early Care and Education: Does De-Implementation of Inappropriate Feeding Practices Increase Adoption of Evidence-Based Practices?

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Special Interest Group: E. Implementation and scalability (SIG)

Purpose: The use of inappropriate feeding practices is a significant problem in early care settings and contributes to negative effects on children's eating behaviors and dietary intake. Through a stakeholder-engaged process, the study team developed a de-implementation strategy targeted at inappropriate feeding practices to augment an existing multi-faceted implementation strategy directed at uptake of evidence-based nutrition practices. The de-implementation strategy leveraged a peer learning collaborative and improvisation-based training. We hypothesized that the adoption of evidence-based practices would improve when combined with strategies that actively remove inappropriate feeding practices. We also examined 3 potential mechanisms of de-implementation suggested by i-PARIHS.

Methods: A pre-post design in 25 classrooms examined changes in feeding practices at meals and lessons. We also examined changes in targeted mechanisms of relationship quality in the classroom (e.g., trust), relationship quality with facilitators, and perceived barriers. Baseline data for feeding practices at both lessons and meals were taken by averaging across three time points from the prior school year. Teachers provided baseline data on proposed mechanisms at the training in August 2019. The research team collected all post-intervention data in January or February of 2020. Analyses used t-test comparisons to examine differences in outcomes and mechanisms between baseline and post-intervention data collection.

Results: At nutrition lessons, educators decreased inappropriate feeding practices by an average of 3 per lesson overall (significant reductions for 5 inappropriate feeding practices, e.g., pressure to eat) and increased evidence-based practices by an average of 5 overall (significant improvements for 8 practices, e.g., hands-on exposures). At meals, overall classroom use of inappropriate feeding practices was significantly reduced by an average of 5 practices ($t_{24} = 2.0$, $p = .05$). We observed 2 significant changes in the proposed mechanisms; co-teacher relationship quality improved significantly ($t_{44} = 2.7$, $p = .01$), and perceived barriers to implementation reduced significantly ($t_{45} = 3.3$, $p = .002$).

Conclusions: Findings from this study support the hypothesis that de-implementation of inappropriate practices can create space to improve adoption of evidence-based practices. Improvement in targeted mechanisms suggests strategies improved internal relationships and reduced perceived barriers toward the goal of de-implementation.

Health-related quality of life in English primary school children: cross-sectional and longitudinal associations with cardiorespiratory fitness

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Special Interest Group: H. Policies and environments (SIG)

Purpose: Health-related quality of life (HRQoL) is a person's self-perceived functioning and well-being in physical, social, and mental domains of health. Children's HRQoL may be enhanced through development of components of physical fitness but the relationships between fitness and HRQoL have seldom been investigated. The purpose of this study was to investigate the cross-sectional and longitudinal associations between English primary school children's cardiorespiratory fitness (CRF) and HRQoL.

Methods: This study involved 383 children (age 10.0 ± 0.5 years) recruited from 20 primary schools situated in northwest England. Data were collected on two occasions 12 weeks apart. On each occasion the children completed the 20m Shuttle Run Test (20mSRT) with the number of laps completed used as a proxy indicator of cardiorespiratory fitness (CRF). HRQoL was assessed using the KIDSCREEN-10 questionnaire and the children self-reported their physical activity using the English version of the Youth Activity Profile. Anthropometric assessments of height, weight, and waist circumference were taken and home postcodes were used to generate neighbourhood-level measures of socioeconomic status (SES). Linear mixed models with random intercepts (schools) assessed associations between CRF and HRQoL cross-sectionally, and longitudinally with HRQoL at 12 weeks as the outcome.

Results: After adjustment for sex, time of year, maturation, SES, waist-to-height ratio (WHtR) and physical activity, CRF was significantly associated with HRQoL ($\beta=0.09$ (95% CI=0.02, 0.16), $p=0.015$) in the cross-sectional analysis. In the longitudinal analysis CRF at baseline was significantly associated with HRQoL at 12 weeks after additionally controlling for baseline HRQoL ($\beta=0.08$ (95% CI=0.002, 0.15), $p=0.045$).

Conclusions: HRQoL in primary school children was cross-sectionally associated with CRF. This association remained significant over a 12-week period of time although the magnitude of the association diminished. Twelve weeks corresponds to the duration of a typical English school term, during which time schools can provide multiple opportunities to enhance children's fitness status through structured and unstructured physical activity. These findings support the promotion of fitness through school physical activity programmes to enhance children's well-being.

Hearing Assessor perceptions for quality implementation of infant and young child feeding and physical activity in early education and care settings in Australia

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Special Interest Group: F. Early care and education (SIG)

Purpose: The implementation nutrition and physical activity guidelines within Australian early childhood education and care (ECEC) is integral for the health of children and is dependent on collaboration. The quality assessment of services within the Australian National Quality System is undertaken by the Department of Education assessors in line with legislation. Assessors have a unique perspective on monitoring and assessment due to visiting multiple services in their region and collaborating with assessors from other regions. This study sought to capture the under-explored experiences of assessors for ECEC services in Queensland, to give insight into the implementation of infant and young child nutrition and physical activity within the National Quality Framework.

Methods: Five multi-region teleconferences using professional conversations with Assessors (n=10) who assess metropolitan, regional and remote areas were conducted in Queensland, Australia to inform qualitative analysis of data guided by the Framework method and Social Cognitive Theory.

Results: Four identified themes emerged using inductive and deductive analysis, guided by Social Cognitive Theory impacting the implementation of nutrition and physical activity guidelines: (1) Supportive Equitable Environments; (2) Efficacy; (3) Working with Parents; and (4) Regulatory Compliance. Important findings included increasing visibility of infants and young children in policies; focussing educator training to build efficacy in infant and young child feeding and physical activity, working with parents and increasing educator efficacy for the assessment process to increase collective agency.

Conclusions: This study presents the results of the first Australian study investigating the experiences of assessors who help to implement NQF legislation and uphold quality through assessment and ratings of services. Inclusion of assessors in future studies as key stakeholders will increase best-practice for educators and short- and long-term health outcomes for infants and young children in ECEC settings.

Home cooking practices are associated with weight loss among participants in a digital lifestyle intervention

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Special Interest Group: J. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

Purpose: Cooking education is an increasingly popular component of lifestyle interventions, but the relationship between cooking, diet, and weight loss is unclear. This study examined home cooking practices among participants in a digital weight loss intervention and how they relate to demographic factors, dietary behaviors, and weight loss.

Methods: Two hundred and eighty-eight overweight/obese individuals participated in the Vibrant Lives digital nutrition and physical activity program over 2 waves (mean age = 42.5, 39% Hispanic, 88% female). Self-reported demographics, anthropometrics, and dietary behaviors were collected pre and post intervention. Cooking practices, as assessed by the Healthy Cooking Index (HCI), were assessed post intervention in wave 1, and pre and post intervention in wave 2. HCI scores were examined in relation to demographics, diet, and weight loss. Using data from wave 2, we evaluated the relationship between change in HCI and weight loss.

Results: Of the 288 participants, 86.4% reported cooking at home within last 2 days. The mean HCI score post intervention was 2.69 (possible range -9 to +10). HCI scores were higher (indicating healthier cooking) among participants that reported low consumption of red meat ($t(247)=3.24$, $p=0.001$) or fast food ($t(247)=3.98$, $p<0.001$), and those that reported eating more than 2 cups of fruit ($t(247)=2.08$, $p=.038$) or vegetables ($t(247)=2.09$, $p=0.037$) per day. Higher HCI scores post intervention were associated with weight loss ($\beta = -1.49$, $t(245) = -3.91$, $p < 0.001$). This relationship persisted after adjusting for diet variables ($\beta = -1.17$, $t(245) = -2.89$, $p=0.004$). In wave 2, HCI scores improved over the course of the intervention ($t(65) = 2.24$, $p = 0.029$). Increases in HCI score from pre to post intervention were not significantly associated with weight loss ($\beta = -1.53$, $t(64) = -1.85$, $p = 0.069$).

Conclusions: Cooking skills may help individuals integrate nutritional recommendations and intervention lessons more effectively into the home food environment. Our preliminary results suggest cooking quality is associated with weight loss and healthy eating behaviors in the context of a digital DPP intervention, but more research is needed.

Home-based exercise for adults with overweight or obesity: A rapid review

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Special Interest Group: L. Other

Purpose: The rising number of people in the United Kingdom (UK) living with overweight and obesity has highlighted a need for continued preventive strategies, such as increasing physical activity and reducing sedentary behaviour. However, the COVID-19 pandemic has limited community fitness opportunities, reduced daily energy expenditure and increased energy intake, contributing to the increase in people living with excess weight. This increases the risk of COVID-19 resulting in adverse outcomes including hospitalisation, advanced levels of treatment and death. The first UK lockdown period from March 2020 resulted in an increase in the number of social media influencers and self-proclaimed fitness gurus promoting and delivering home-based exercise sessions. However, this is not a sustainable, evidence-based solution, tailored to specific population groups with morbidities.

This rapid review conceptualises home-based exercise programmes for individuals with excess weight, to encourage the production of efficacious and effective, home-based exercise programmes.

Methods: MEDLINE, SPORTDiscus, CINAHL and AMED databases will be searched, using search terms and Boolean operators including 'home based exercise' AND 'overweight' OR 'obesity'. Studies must have been published within the last ten years. Participants must be adults ≥ 19 years, with a Body Mass Index of ≥ 25 kg/m², that had undertaken a home-based exercise programme, which may be multi-modal. Publications not available in English, programmes intended for rehabilitative purposes, multi component programmes e.g. with a diet intervention, along with those undertaken in the community will be excluded. Extracted data will be recorded and analysed to allow for comparisons between programmes and control.

Results will be ready for presentation at the Xchange, focussing on participant demographics, programme details, health and fitness outcomes, adherence and directions for future research.

Conclusions: Individuals with overweight and obesity are at a higher risk of contracting COVID-19 and experiencing less favourable outcomes. This rapid review will conceptualise home-based exercise programmes, providing much needed direction for developing guidelines and content to construct and implement efficacious, effective, evidence-based exercise programmes at scale.

How are weight management efforts associated with overall diet quality in Brazilian adolescents and young adults? Results from Health Survey in São Paulo

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Special Interest Group: G. Children and families (SIG)

Purpose: Previous research from high-income countries has shown adolescents' and young adults' efforts to lose or maintain weight are associated with dietary quality. This research has found that youth that engages in more healthful strategies, such as reducing intake of unhealthy food, have higher diet quality whereas youth that engages in unhealthy behaviors, such as fasting or skipping meals, have lower diet quality. Little is known about how behaviors to control weight are associated with diet quality among youth from low- and middle-income countries. The aim of this study was to examine associations between efforts to control weight (ECW) and diet quality among Brazilian adolescents and young adults.

Methods: Data from 731 participants (19.6±SE 0.3years, 51.1% female) of the 2015 Health Survey of São Paulo were used for this cross-sectional study. Dietary intake was assessed using a 24h dietary recall and diet quality was calculated using the Brazilian Healthy Eating Index - Revised (BHEI-R). Participants reported their ECW, weight satisfaction, and socio-demographics. Descriptive statistics and linear regressions were calculated to investigate associations between ECW and diet quality.

Results: BHEI-R mean score was 54.8 (SE ±0.43) classifying participants as "needs improvement". From all respondents, 47.7% were dissatisfied with their current weight, and 41.0% reported ECW. Reported strategies to control weight included increased physical activity, controlling what they ate, and dieting (8.2%, 3.1%, and 2.5%, respectively). After adjusting for covariates (age, sex, race/ethnicity, and BMI), participants reporting at least one reported ECW ($\beta = 0.08$; 95%CI 0.02, 0.13), controlling what they ate ($\beta = 0.15$; 95%CI 0.08, 0.22), practicing regular physical activity ($\beta = 0.04$; 95%CI 0.00, 0.07) and satisfied with their weight ($\beta = 0.08$; 95%CI 0.02, 0.13) were associated with a higher overall BHEI-R mean score.

Conclusions: Engaging in behaviors to control weight, i.e., increased physical activity, controlling what they ate, and dieting, was associated with higher diet quality among a sample of Brazilian youth. Future research should further explore the weight control behaviors that Brazilian youth are engaging in, including disordered eating behaviors, and the associations between these behaviors and diet quality among Brazilian youth.

How does the outdoor play space afford aspects of physical literacy development?

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Special Interest Group: F. Early care and education (SIG)

Introduction: Unstructured, self-directed, free play is essential to children's health as it contributes to their physical, cognitive, and social-emotional development. Unfortunately, there has been a significant decline in children's outdoor play; time spent outdoors is now spent indoors which is concerning given the health benefits of playing outside. One way to enhance children's outdoor play experiences and increase the time spent outdoors is through the integration of loose parts (LP) in the outdoor play space. LP are materials that can be manipulated and combined in various ways (e.g. wooden planks, crates, tubes). The open-endedness of LP play allows children to move their body in different ways encouraging gross motor development, balance, and coordination, all which affords children the opportunity to develop physical literacy (PL): the motivation, confidence, physical competence, knowledge and understanding to be active for life.

Purpose: The purpose of this project is to explore how the outdoor play space affords aspects of PL development in children attending before and after school programs in Nova Scotia, Canada.

Methods: Using a quasi-experimental, multi methods design, LP materials will be integrated in an intervention site with a control site set as a comparison. Children's PL will be captured through the process of behavioural mapping. Behavioural mapping is a research tool used to observe and record behaviours occurring in a particular setting at a particular time. Using this technique, children's fundamental movement skills and physical activity behaviour will be observed and recorded, comparing the observations pre-post the implementation of the LP intervention, and to the control site. At the end of the intervention, go-along interviews will be conducted with children at the intervention site to capture the affective components of PL.

Anticipated Results: Preliminary findings from our previous work (PLEY project) demonstrates that outdoor LP play diversifies children's movements. Similar findings are expected for this project.

Conclusions: To date, aspects of PL in the context of outdoor LP play have not been explored using behavioral mapping. This project will be a critical step to understanding how we can support quality outdoor play experiences for children while optimizing their overall health and wellness.

IMPACT DIABETES B2B Project: Implementation protocol for a system of care for prevention of overweight, obesity and diabetes in women at risk of gestational diabetes

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Special Interest Group: E. Implementation and scalability (SIG)

Purpose: Lifestyle interventions during pregnancy have proven success in limiting excess gestational weight gain and reducing the risk of non-communicable diseases such as gestational diabetes, type 2 diabetes, and obesity. However, existing successful interventions have not moved beyond the research phase to consider implementation into routine service. The IMPACT DIABETES B2B project (IDB2B) is an EU funded multi-centre project that has been designed to demonstrate the real-world implementation of an evidence-based, effective system of care for prevention of diabetes, overweight, and obesity when delivered 'at scale' across antenatal settings.

Methods: The Exploration, Preparation, Implementation, Sustainment (EPIS) model frames the IDB2B project design. The intervention consists of a validated gestational diabetes risk screening tool that will be incorporated into usual care. Women at risk of gestational diabetes will be randomised to receive support and information on healthy eating and physical activity either via usual care or mHealth app with personalised health coaching over 18 months. The RE-AIM framework will be used for IDB2B evaluation. Efficacy, fidelity, penetration, and cost effectiveness will be examined across 4 clinical sites within Ireland, UK, Spain, and Australia.

Results: Implementation science and behaviour change theory provide a framework to ensure IDB2B can be suitably evaluated for its scalability and roll out in other settings.

Conclusions: A large research translation gap exists around delivering implementable interventions with adequate population penetration and participation. IDB2B aims to bridge the healthcare gap between pregnancy and the post-natal time period to improve health outcomes for high risk mothers and babies in a cost-effective manner.

Impact of exposure to fast-food outlets and physical activity facilities on Body Mass Index in the general population: a longitudinal cohort study

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Special Interest Group: H. Policies and environments (SIG)

Purpose: Unfavorable fast-food and physical activity environments may contribute to Body Mass Index (BMI). However, current evidence on the association between exposure to fast-food outlets and physical activity facilities and BMI is mainly based on cross-sectional data. Furthermore, many studies used self-reported BMI measures instead of objectively measured BMI. We examine associations between residential exposure to fast-food outlets and physical activity facilities and changes in objectively measured BMI, and investigate to what extent these associations are moderated by changes in the exposure to fast-food outlets and physical activity facilities.

Methods: We will use adult (18+) data from two waves (mean (SD) follow-up time 3.9 (1.2) years) of the Lifelines Cohort Study. Participants' residential addresses are linked to fast-food outlet and physical activity facility locations through geo-coding. Exposure to fast-food outlets and physical activity facilities will be computed in terms of proximity and 1-kilometre (km) density, and categorized into whether exposure increased, decreased, or remained the same. Multilevel linear regression analyses were used, taking the neighbourhood level effects into account. Analyses were adjusted for various individual-level and environmental potential confounders. To examine the impact of whether the exposure increased, decreased, or remained the same, we will test their interaction terms with the exposure of fast-food and physical activity facilities at baseline.

Results: The 106,059 participants had a mean (SD) baseline BMI of 26.0 (4.2). The median (IQR) change in BMI was 0.15 (-0.68 – 1.00). The baseline median (IQR) number of fast-food outlets within 1km was 3 (1 – 7). The baseline median (IQR) number of physical activity facilities within 1km was 1 (0 – 3). Overall, 30.7% of the participants experienced an increase in number of fast-food outlets within 1km. Besides, 22.2% experienced a decrease in number of fast-food outlets within 1km. Regarding the number of physical activity facilities within 1km, the percentage of participants that experienced an increase and a decrease was 23.7% and 18.9%, respectively.

Conclusions: Findings of this study will elucidate the potential influence of fast-food and physical activity environments on BMI. Furthermore, this study may inform policy-makers on how to design healthier environments.

Impact of Nudge Strategies on Nutrition Education Participation in Early Childhood Education and Care: Randomized Controlled Trial

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Special Interest Group: F. Early care and education (SIG)

Purpose: Evidence suggests nutrition education can improve staff nutrition knowledge and centre compliance with nutrition guidelines, within the early childhood education and care setting. Despite the potential impact of such nutrition education, the uptake of such opportunities within the setting is poor. Nudge strategies are an attractive approach to influence behaviour, as they are low-cost and have been shown to be effective in improving participation in population-level public health programs. This study aimed to assess the impact of incorporating nudge strategies in the design of a nutrition education workshop invitation on workshop registration among early childhood education and care centres. Secondary aims were to assess invitation recall and invitation acceptability.

Methods: A parallel-group randomized controlled trial was conducted with 88 centre-based childcare centres in Hunter New England, New South Wales, Australia. Centres randomised to the intervention received nudge strategies (messenger, incentive, norms, salience, priming, commitment and ego) embedded within an enhanced invitation to attend a nutrition education workshop. Centres randomised to the control group received a generic invitation. Childcare centre workshop registration, invitation recall and invitation acceptability were measured post-intervention only via online registration records and a computer assisted telephone interview. Logistic and linear regression models were used to compare differences between the two arms.

Results: No statistically significant differences in workshop registration (25% vs 20%; $P = 0.61$), invitation recall (69% vs 62%; $P = 0.58$) or invitation acceptability (mean: 8.38 vs 8.06; $P = 0.50$) were found between the intervention and control arms, respectively. The advertisement of accredited professional development contribution was reported as the most appealing feature within the enhanced invitation.

Conclusions: Low-intensity behavioural strategies embedded in the design of an invitation were insufficient to significantly increase workshop registration. Investigation and application of alternate evidence-based nudge strategies to encourage staff participation in nutrition education in the early childhood education and care setting is recommended.

Impact of School-Level Factors on Farm-to-School Prevalence

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Special Interest Group: H. Policies and environments (SIG)

Purpose: Farm to school (FTS) program prevalence with respect to various school and student level factors was analyzed, including race/ethnicity, proportion of children on free or reduced-price meals (FRPM), and school level (elementary vs middle/high school). It was hypothesized that there will be a higher prevalence of FTS programs in elementary than middle/high schools, for non-white ethnic groups, and in schools with a lower proportion of students eligible for FRPM. There is a gap in research on the prevalence of FTS in higher grade levels as well as with respect to socioeconomic factors.

Methods: A secondary analysis on cross-sectional data from the New Jersey Child Health Study (NJCHS) on FTS prevalence was conducted from a sample of schools (n=497) located in four cities from 2010 to 2017. T-tests and chi square analyses were used among bivariate data before and after the enactment of the Healthy Hunger-Free Kids Act (HHFKA) as well as for each individual year to compare FTS prevalence with various factors. A robust linear regression was also conducted with respect to both pre vs post-HHFKA and individual in order to model multivariate associations between school-level factors.

Results/findings: FTS prevalence significantly increased after the implementation of the HHFKA for both elementary ($p=0.001$) and middle/high school ($p=0.049$), with elementary schools having a higher FTS prevalence both before ($p=0.043$) and after ($p=0.001$) the HHFKA. There was no statistical difference in the prevalence of FTS with respect to race or proportion of students on FRPM. Additionally, there was a statistical increase in FTS prevalence for years 2016 ($p=0.008$) and 2017 ($p=0.003$) using the linear regression model accounting for school-level factors, although a large confidence interval was noted.

Conclusions: FTS programs fluctuate over time due to a variety of factors, including schools not maintaining these programs or not having proper champions advocating for these policies. In addition, this study reflects the need for more FTS advocacy in middle and high schools due to their low FTS program prevalence compared to elementary schools. More research must be done to determine how FTS prevalence impacts pediatric health outcomes, especially with respect to socioeconomic factors.

Implementation of the Guidelines on Quality Standards for Canteens in the Workplace developed by the German Nutrition Society (DGE) – a controlled pretest-post-test-study regarding food consumption, nutrient intake, perception and satisfaction by canteen users

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Special Interest Group: H. Policies and environments (SIG)

Purpose: The study aimed to evaluate the effectiveness of the German Nutrition Society's Guidelines on Quality Standards for Canteens in the Workplace (DGE-GQS; health promoting food option). The DGE-GQS was implemented in a university canteen. Possible changes of food consumption and nutrient intake of canteen users (substudy A) at least ten weeks after the implementation of the DGE-GQS, the perception of the health promoting food option by the canteen users (substudy B.1), and possible changes of their satisfaction regarding the canteen (substudy B.2) were examined.

Methods: Substudy A used a controlled pretest-posttest-design (paired sample). The participating university students were classified as intervention group (IG, canteen visits \geq once/wk) or control group (CG, canteen visits $<$ once/wk). In substudy B.1 a cross-sectional design was used, in substudy B.2 a pretest-posttest-design (paired sample). Substudy B included students, if they visited the canteen \geq once/wk.

Results/findings: Food consumption and nutrient intake did not change ($p > 0.05$) in the IG ($n = 27$, 92.6 % female, 21.5 ± 2.7 years) compared to the CG ($n = 39$, 94.9 % female, 22.8 ± 3.4 years) (substudy A). In substudy B.1 canteen users ($n = 90$, 77.8 % female, 23.5 ± 4.3 years) were aware of the health promoting food option and highly appreciated it. They were satisfied with the health promoting food option and bought the health promoting lunch offer 0.8 ± 0.9 times/wk or every third (34.3 ± 34.1 %) canteen visit. In substudy B.2 the canteen users ($n = 30$, 86.7 % female, 23.5 ± 6.3 years) were at posttest more satisfied with the service and the health value of the lunches offered (both: $p < 0.05$).

Conclusions: Although the health promoting food option was known and highly appreciated, no effects on the daily food consumption and nutrient intake were observed. The proportion of the health promoting lunch option should be increased.

Improving the dietary intake, physical activity and weight status of children attending family day care services: A systematic review of interventions

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Special Interest Group: F. Early care and education (SIG)

Purpose: Early childhood education and care services represent an important setting for implementing health-promoting strategies for young children. Despite this, there is no known review evidence available regarding the effectiveness of interventions to improve healthy eating and physical activity for children attending family day care. The aim of this study is to (i) identify and synthesise findings from interventions to improve the dietary intake, physical activity and weight status of children aged 0–6 years attending family day care services; and (ii) assess the impact of interventions on family day care environments, intervention cost and adverse outcomes.

Methods: Medline in Process, PsycINFO, ERIC, Embase, CINAHL, CENTRAL and Scopus databases were searched in March 2019. Studies were included if they i) evaluated an intervention to improve the diet, physical activity and/or weight of children aged 0–6 years; ii) were delivered in family day care services; iii) targeted child diet, physical activity and/or weight and; iv) used a parallel control group design. Two reviewers completed screening, data extraction and risk of bias for each study, with disagreements resolved by a third reviewer. Interventions and outcomes were narratively described.

Results/findings: The search yielded 8,977 title, with 199 full texts screened. Two studies met the inclusion criteria. Both the four year community-wide obesity prevention program, and the 12-month train-the-trainer program, reported statistically significant improvements in the healthy eating and physical activity environments of family day care, compared to cross-sectional state average control groups. Neither study reported on child outcomes, intervention costs or adverse outcomes. Two ongoing studies measuring outcomes at child levels were also identified.

Conclusions: Findings highlight few existing interventions in family day care services. While results are promising, high-quality controlled trials in this setting are needed to identify the effectiveness of strategies on children's diet, physical activity and weight. Further, the evaluation of intervention costs and adverse events during interventions is required to provide a more comprehensive understanding of the intervention, particularly for decision-makers.

Improving the implementation of school-based healthy eating and physical activity policies and practices: a systematic review

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Special Interest Group: E. Implementation and scalability (SIG)

Purpose: Although best practice recommendations exist regarding school-based healthy eating and physical activity policies, practices and programmes, research indicates that implementation is poor. The primary aim of this review was to examine the effectiveness of strategies that aim to improve the implementation of school-based policies, practices or programmes to address child diet, physical activity, or obesity. The most recent systematic review of strategies to improve implementation of healthy eating and physical activity interventions in schools was published in the Cochrane Library in 2017. As the field of implementation science is rapidly evolving and a number of studies have been since published, an update of the review was required to reflect the current evidence-base.

Methods: A search of electronic databases and trial registries was conducted on 10th April 2019. Authors independently screened abstracts for eligibility, extracted trial data and assessed risk of bias. Studies with a parallel control group that compared any strategy to improve the implementation of a healthy eating or physical activity policy, practice or programme by school staff to no intervention, 'usual' practice or an alternative strategy were included. Due to substantial heterogeneity between studies, a narrative synthesis of included studies was conducted.

Results: In addition to the 22 studies included in the original Cochrane review, a further eight studies were identified as eligible. Collectively, the 30 studies sought to improve the implementation of healthy eating (16 studies), physical activity (11 studies) or both healthy eating and physical activity (three studies). Studies tested a range of implementation strategies, including educational materials and educational meetings. The narrative synthesis indicated that effect sizes of strategies to improve implementation were highly variable across studies. For example, among 10 studies reporting the proportion of schools implementing a targeted policy or practice, the median unadjusted effect size was 16.2%, ranging from -0.2% to 66.6%.

Conclusions: Despite considerable heterogeneity in the effects of implementation strategies, the findings provide some evidence to support the effectiveness of strategies in enhancing the nutritional quality of foods served at schools, the implementation of canteen policies and improvements in the time scheduled for physical education.

Increasing physical activity and reducing sedentary behavior at the workplace: an umbrella review

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Special Interest Group: H. Policies and environments (SIG)

Purpose: Workplace interventions to increase physical activity and reduce sedentary behavior among employees have been evaluated in various reviews. However, most published reviews focus on specific interventions types, behaviors and/or populations making it difficult to draw a conclusive picture of the evidence. The purpose of this umbrella review is to identify and synthesise all systematic reviews and primary studies on physical activity and sedentary behavior workplace interventions (PROSPERO registration number CRD42020171774).

Methods: We conducted a systematic search in six scientific databases to identify systematic reviews published as peer-reviewed articles and doctoral dissertations from 2000 to 2020. Backward citation tracking and searches of relevant websites complemented the search. Reviews with or without meta-analysis and in any language were included if they evaluated the effects of workplace interventions on physical activity and/or sedentary behaviors in adult employees. Two independent reviewers screened titles, abstracts and full-texts for inclusion. Data extraction, and risk of bias appraisals using the AMSTAR 2 tool were also conducted in duplicate. To analyse the data, we extracted primary studies included in the reviews and grouped them based on intervention level (individual, social, environmental, organisational, multi-component) and type (e.g., self-monitoring intervention within individual level interventions). In our analyses we report the effects of interventions on physical activity and sedentary behavior according to intervention level and type. Finally, we will use the Grading of Recommendations Assessment, Development and Evaluation (GRADE) method to rate the quality of evidence for each of these outcomes, at each level and for each intervention type.

Results: The data base search revealed 6444 items, of which 31 were included in our umbrella review. Additional search strategies identified 10 more reviews bringing the total to 41 reviews being included. More than 120 primary studies were identified. Analysis is in its final stages and will be completed by March 2021.

Conclusions: Our umbrella review will provide guidance to those planning to implement strategies addressing sedentary behaviour or physical activity at workplace. We will also indicate research gaps and make recommendations for advancing workplace sedentary behaviour and physical activity research.

Integration of nutrition education within the primary schools curriculum: a scoping review

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Special Interest Group: F. Early care and education (SIG)

Purpose: Schools play a fundamental role in the prevention of childhood overweight and obesity by providing nutrition education. Teachers currently struggle to effectively implement nutrition education in their classrooms due to an overcrowded curriculum and perceived lack of time. Integration of nutrition content into core school subjects has been suggested to reduce this time barrier, thereby enhancing implementation. However, it is unclear how integrative approaches have been used in interventions and whether this approach is effective. This scoping review aimed to explore the use and effectiveness of integrative teaching in primary school-based nutrition programs.

Methods: Six databases (i.e., Medline, CINAHL Complete, Embase, Scopus, EBSCO Megafire Ultimate and Eric) were searched, for primary school-based interventions that focused on nutrition education. Only papers reporting on the integration of nutrition topics within core curriculum were included. Abstracts and full texts of potentially relevant articles were screened in duplicate using Covidence™ software to determine eligibility for inclusion. Data were extracted and findings were collated and summarised to describe the interventions characteristics, subject integration and effectiveness of the included programs.

Results/findings: Of 3328 possible database entries identified, data describing the integration of nutrition into the primary school curriculum was extracted from 39 eligible papers. Nutrition education programs frequently involved lessons about food groups and were commonly integrated with educational standards for mathematics, science or literacy. Although articles reported on the integration of nutrition, this was not commonly defined and detailed description was usually lacking. Furthermore, nutrition programs are mostly implemented through professional development of classroom teachers. Only seven papers discussed student outcomes related to the integration of nutrition education within core subjects.

Conclusions: Firm conclusions about the effectiveness of school-based nutrition intervention that embed integrative teaching cannot be drawn currently because of the lack of program description and methodological limitations. However, this review provides evidence in support of further evaluation of integrative nutrition education programs in

primary schools. Current review findings should guide future trials and classroom practices. Prospective studies that include a detailed explanation of the integrative approach and evaluation of effectiveness are needed.

Internet use and risks reported by university students during the COVID-19 pandemic

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Special Interest Group: L. Other

Purpose: Emerging research has shown an increase in internet use among young adults during the COVID-19 pandemic, raising concerns about the potential for increased internet-related adversities and risks. The purpose of this study was to examine: (1) the self-reported internet use and risks among university students both prior to and during the early stages of the COVID-19 pandemic; and (2) the adverse effects associated with social media use reported by students at the beginning of the pandemic.

Methods: University students (n = 1,635; Mage = 22.4, SD = 5.2; 79.4% female) completed relevant sections of an online survey during the early onset of the COVID-19 pandemic in Ontario, Canada (March-April 2020) as part of the larger "iBelong" project. Items used for the purpose of the present study were adapted from the Canadian Internet Use Survey (Statistics Canada, 2018) and included: (1) self-reported internet use and internet-related risks (e.g., bullying, harassment, discrimination) both prior to and during the pandemic; and (2) self-reported adverse effects associated with social media use (e.g., spending more time than intended online, feeling anxious, depressed, etc.).

Results: Results showed that 18.2% and 44.5% of students reported spending 40+ hours/week on the internet prior to and during COVID-19, respectively. With regard to online risks, students reported slight increases in bullying (%prior = 4.2; %during = 6.2) and discrimination (%prior = 6.9; %during = 7.6), and decreases in fraudulent identity use (%prior = 2.4; %during = 1.3), stalking (%prior = 4.5; %during = 2.7), and harassment (%prior = 5.8; %during = 5.0). With regard to the adverse effects of social media use, university students reported spending more time online than intended (49.1%), having trouble concentrating on school or work tasks (34.5%), losing sleep (26.2%), feeling envious of the lives of others (33.1%), and sometimes feeling anxious (30.5%) and depressed (23.4%).

Conclusions: Results will be discussed with a focus on implications for young people, as well as next steps for this area of research. The findings from this study provide an important basis from which we can understand the internet-related challenges experienced by university students during the COVID-19 pandemic.

Intersectional correlates of meeting 24-Hour Movement Guidelines: Korea Youth Risk Behaviour Survey 2019

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Special Interest Group: I. Socio-economic inequalities (SIG)

Purpose: Physical activity is beneficial for the physical and mental health of adolescents; however, an insufficient amount of physical activity is related to various diseases. Based on intersectionality approaches, this study examined associations between intersectional correlates and meeting Canadian 24-Hour Movement Guidelines for Children and Youth among Korean adolescents aged between 12 and 17 years.

Methods: Findings were based on 24,619 Korean adolescents (Mage = 14.77) who participated in the Korea Youth Risk Behaviour Survey (KYRBS) 2019 (N = 60,100). Exposures included sex, as the centre of analysis with social class: family economic status; parental education level; and academic performance. An outcome included moderate to vigorous physical activity (MVPA) that were categorized according to Canadian 24-Hour Movement Guidelines for Children and Youth: met or not met the guidelines. Covariates included age and body mass index (BMI) in each analysis model. Multiple logistic regression analyses were conducted.

Results: Overall, compared to female adolescents with low social class, being male with high family economic status (OR: 4.53, 95%CI: 3.90-5.27) and high academic performance (OR: 3.96, 95%CI: 3.55-4.43) was consistently and highly associated with meeting the guideline more than those with low family economic status (OR: 3.45, 95%CI: 2.89-4.11) and low academic performance (OR: 3.58, 95%CI: 3.15-4.05).

Conclusions: The findings support that being male regardless of social class considerably tends to meet the guideline compared to female adolescents with low social class. Intersectionality approach in quantitative research may be a useful framework to promote more inclusive physical activity participation among South Korean adolescents.

Intersectionality in physical activity participation: A systematic scoping review

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Special Interest Group: I. Socio-economic inequalities (SIG)

Purpose: Physical activity participation is known to vary across individuals with different social position. Intersectionality theory helps us to better understand experiences of multiple interlocking systems of oppression and privilege shaped by intersections of individuals' social categories. The objectives of this systematic scoping review were (1) to summarize the findings of articles examining physical activity participation claimed operationalization of intersectionality and (2) to identify the scope and gaps pertaining to the operationalization of intersectionality theory in physical activity research.

Methods: A search was conducted in September 2019 in seven electronic databases (e.g., SPORTDiscus, Web of Science) for relevant research articles written in English. Key search terms included intersectionality, physical activity, and sport. Screening, extraction, descriptive, and content analyses, and narrative synthesis were conducted between September 2019 and May 2020.

Results: Of 16,564 articles identified, 45 articles were included in this review. The majority of included articles used qualitative methods (n = 41), with two quantitative and two mixed-methods articles. The most frequently observed intersectional social position was sex/gender + race/ethnicity (n = 11), followed by sex/gender + race/ethnicity + sexuality (n = 6) and sex/gender + race/ethnicity + religion (n = 6). Most qualitative studies (n = 38) explicitly claimed operationalization of intersectionality as a key theoretical framework, and over half of these studies (n = 27) implicitly used intra-categorical intersectionality. Two quantitative studies examined a number of intersections simultaneously using inter-categorical intersectionality and various statistical techniques including additive, multiplicative, and/or stratified models to investigate intersectionality in physical activity participation.

Conclusions: This review found that complex processes of individual and social-structural level factors that drive inequalities in physical activity participation could be better elucidated using intersectionality theory. Intersectionality theory may serve as a useful framework in both qualitative and quantitative investigations; however, advancement in quantitative intersectionality is critical in order to produce knowledge that could inform more inclusive physical activity promotion efforts.

Introducing food as human right in nursing education to promote better nutritional care in nursing homes

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Special Interest Group: A. Ageing (SIG)

Purpose: Older adults in nursing home are at risk for mal- and undernutrition. A human rights perspective could contribute to better nutritional care for older adults at nursing home, but few studies investigate how to introduce human rights in nursing education. The aim of this study was to investigate how to introduce food as a human rights perspective for nursing students combining education at campus and in clinical placement at nursing home.

Methods: The study took place from 2017-2018. Based on educational design research, two iterative cycles were conducted. In the 1st cycle, qualitative method with multistage focus group interviews with 18 nursing students was used to get knowledge and understanding about nursing students' definitions and experiences of the right to food. In the 2nd cycle, qualitative methods with focus group interviews with 26 nursing students and their written assignments was used to get knowledge and understanding about the nursing students learning about the right to food.

Findings: The study showed that definitions and experiences about human rights were highly influenced by the placement in nursing home. The study showed the importance of clinical practice for students to understand human rights, and the importance of interhuman relations for learning about and promoting human rights. A human rights perspective contributed to development of a language about human rights and brought in a more holistic approach to the phenomenon of food through the right to food. Awareness of human rights seemed to make the students take autonomous decisions regarding nutritional care following values related to social justice and dignity, and gave them a perspective of structural challenges related to the right to food.

Conclusions: Introducing a human rights perspective can enable recognizing situations where the right to food is violated. In the learning process practical placement is of key importance. Combining human rights perspective with nursing ethics perspective can improve nursing students capacity to deal with challenging food related situations thus improving the nutrition situation at nursing homes.

Intuitive eating and diet intake in US adults

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Special Interest Group: K. Disease prevention and management

Purpose: Intuitive eating (IE) which includes unconditional permission to eat (UPE), reliance on hunger and satiety cues (RHSC), eating for physical rather than emotional reasons (EPR), and body-food choice congruence (B-FCC) is an alternative paradigm to encourage healthful behaviors. IE has been associated with positive health benefits, yet the research investigating IE with diet intake is minimal, inconsistent, and may differ by sex and food security status. The purpose of this study is to identify relationships between IE and diet intake in adults living in the US and explore differences by sex and food insecurity status.

Methods: We recruited 308 adults 18 years and older living in the US to complete an online survey including demographic data, IE, a diet screener questionnaire, and food insecurity. We used structural equation modeling to analyze relationships between IE subscales, calcium, whole grains, added sugars, vegetables, and fruits. Then, we explored differences by sex and food insecurity status.

Results: Across all groups, UPE was consistently associated with a higher intake of added sugar. B-FCC was associated with a lower intake of added sugar and calcium, and a higher intake of vegetables and whole grains. EPR was associated with a higher intake of calcium and vegetables. In men, RHSC was associated with a lower intake of vegetables and B-FCC was associated with a lower intake of calcium. In women, EPR was associated with a lower intake of added sugar; B-FCC was associated with a higher intake of vegetables, whole grains and fruit. Among food secure adults, EPR and B-FCC were associated with a higher intake of vegetables, while RHSC was associated with a lower intake of vegetables. In food insecure adults, B-FCC was associated with a lower intake added sugar and higher intake of fruit.

Conclusions: While intuitive eating is not consistently related to the intake of more nutritious foods, EPR, RHSC, and B-FCC may promote diet quality. Therefore, in addition to the positive health benefits, IE may be an effective mechanism to promote diet quality. Differences by sex and food insecurity suggest tailoring IE interventions may be essential to increase effectiveness.

Investigating the effects of using Smartphone or Wearable Activity Tracker (SWAT) on physical activity-related behavioral and health outcomes: a systematic review protocol

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Special Interest Group: D. e- & mHealth (SIG)

Purpose: In recent years, fitness armbands and smartwatches, namely wearable activity trackers (ATs), have become increasingly popular. Smartphones with in-built sensors also provide the capacity to monitor physical activity (PA), sedentary behavior (SB), and other health behaviors. There has been rapid growth in the use of wearable or smartphone-based ATs in research and clinical practice to promote PA. However, when designing an intervention based on a smartphone or wearable AT, there is still limited evidence on critical contextual factors contributing to behavior change or health outcomes. This systematic review investigates the effects of intervention using smartphone or wearable AT on PA, SB, or health outcomes in primary and secondary prevention settings. Specifically, we want to evaluate: 1) Are there differences in the effects of these interventions between the general population in primary prevention settings and the clinical patients in secondary prevention settings? 2) Are there differences in these interventions' effects due to the types of device and technology used for tracking? 3) What types of behavior change techniques (BCTs) are the most frequently used in these interventions? 4) Are these interventions more effective if they use BCTs compared to those without BCTs?

Methods: Studies will be identified by searching MEDLINE, PsycINFO, CINAHL, Scopus, Sports Medicine & Education Index, Cochrane Library, and scanning reference lists of relevant reviews. We will include published studies of controlled trial that conducts intervention based on smartphones or wearable devices, applying body/movement sensors or geolocation to monitor PA via biomechanical variables, aimed to improve PA, SB, or health outcomes in primary or secondary prevention settings. Where there are sufficient numbers of studies reporting similar outcome measures, we will calculate and report pooled risk ratios or standardized mean differences.

Results: The preliminary search is completed and identified 22,562 records from the electronic databases.

Conclusions: This study will summarize the evidence-based AT interventions in different contextual settings, explicitly targeted population, device and technology, BCTs, and outcomes. This study will inform users, developers, health professions, and policymakers about the potential of turning this "digital fashion" into digital public health opportunities. (PROSPERO: CRD42020205400)

Investigating the environmental, behavioural, and sociodemographic determinants of attendance at a city-wide public health physical activity intervention: longitudinal evidence over one year

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Special Interest Group: H. Policies and environments (SIG)

Purpose: Understanding the determinants of attendance at public health interventions is critical for effective policy development. Most research focuses on individual-level determinants of attendance, while less is known about environmental-level determinants.

Methods: Data were obtained from the Leeds Let's Get Active public health intervention in Leeds, England. Longitudinal data (April 2015–March 2016) on attendance were obtained for $n = 25,745$ individuals ($n = 185,245$ total visits) with baseline data on sociodemographic determinants and lifestyle practices obtained for $n = 3621$ individuals. This resulted in a total of $n = 744,468$ days of attendance and non-attendance. Random forests were used to explore the relative importance of the determinants on attendance, while generalised linear models were applied to examine specific associations ($n = 3621$). The probability that a person will attend more than once, the number of return visits, and the probability that a person will attend on a particular day were investigated.

Results: When considering if a person returned to the same leisure centre after one visit, the most influential determinant was the distance from their home. When considering number of return visits overall however, age group was the most influential. While distance to a leisure centre was less important for predicting the number of return visits, the difference between estimates for 300 m and 15,000 m was 7–10 visits per year. Finally, calendar month was the most important determinant of daily attendance.

Conclusions: This longitudinal study highlights the importance of both individual and environmental determinants in predicting various aspects of attendance. It has implications for strategies aiming to increase attendance at public health interventions.

Joint associations of physical activity and sleep with all-cause and cancer mortality risk

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Special Interest Group: K. Disease prevention and management

Purpose: Both physical inactivity and poor sleep are deleteriously associated with all-cause and cause-specific mortality, but beyond their independent health effects, the joint effects of these two key behaviors remain largely unknown.

Methods: This is a prospective cohort study based on 380,055 participants (55.9±8.1 years, 55% female) from the UK Biobank with 11.1±1.2 years of follow-up. Baseline physical activity (PA) levels were categorized as high (≥ 1200 metabolic equivalents (MET) minutes per week), medium (600 to < 1200), low (< 600), and no moderate-to-vigorous PA (MVPA). We used an established sleep score based on five healthy characteristics (morning chronotype, adequate sleep duration (7-8 hr/d), never or rarely insomnia, no snoring, and infrequent daytime sleepiness). The sleep score was categorized as healthy (≥ 4 sleep score), intermediate (2-3), and poor (≤ 1). We derived twelve PA-sleep combinations, accordingly. Mortality risks were ascertained to May 2020 for all-cause and cancers (all-type and lung cancer). The association of the two behaviors with mortality was examined with Cox proportional hazard models.

Results/findings: There was a dose-response increase toward poor sleep in all-cause mortality risk with adjustment for selected confounders and PA. Compared to healthy sleepers, the hazard ratio (HR) was 1.05 (95% CI: 1.02 to 1.09) for intermediate sleepers and 1.23 (1.13 to 1.34) for poor sleepers. Compared to those in the referent (optimal) high PA-healthy sleep group, participants with no MVPA-poor sleep combination had the highest mortality risks for all-cause (HR: 1.39 (1.20 to 1.61)), total cancers (HR: 1.30 (1.06 to 1.59)), as well as lung cancer (HR: 1.59 (1.08 to 2.34)). The deleterious associations of poor sleep and all the outcomes were amplified with decreasing PA levels (Pinteraction < .0001).

Conclusions: Low PA deteriorates the adverse effect of poor sleep with both all-cause and cancer-specific mortality risks. Lifestyle behaviors may have synergistic effects on health. The present results support the need to integrate lifestyle behavior interventions in research and clinical practice.

Lifestyle patterns in early childhood and their correlates: a comparative analysis between the GUSTO (Singapore) and EDEN (France) mother-child cohorts

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Special Interest Group: G. Children and families (SIG)

Purpose: Co-occurrence of energy balance-related behaviours of preschool children in Asia and their correlates are poorly known and there are few comparative analyses between Asia and Europe. In cohort studies in Singapore (GUSTO) and France (EDEN), we characterized lifestyle patterns of children and investigated their associations with contextual factors.

Methods: Ten behavioural variables related to the child's diet, outdoor play, walking, and screen time were ascertained using parental questionnaires at age 5-6 years. Sex-specific lifestyle patterns were derived independently for GUSTO and EDEN children using principal component analysis. We categorized contextual variables based on the socio-ecological model [demographic and socioeconomic (10 variables), parental health and lifestyle (7 variables), and parent-child interaction (8 variables)] and examined their associations with lifestyle patterns by three-stage hierarchical linear regression analyses.

Results: Of 630 GUSTO (n=330 boys) and 989 EDEN children (n=527 boys), three similar sex-specific lifestyle patterns were identified in both GUSTO and EDEN: "discretionary consumption and high screen time", "fruit, vegetables, and low screen time" and "high outdoor playtime and walking". The latter two patterns showed marginal differences between cohorts.

Focusing on the common pattern in both cohorts, higher scores on "discretionary consumption and high screen time" were observed in children who often had the TV on while eating, snacked between meals, and whose mothers' diet

were less healthy during pregnancy. In GUSTO, scores for this pattern were higher in children of Malay and Indian ethnicity, with a high allowance of child control over his/her food intake, and those in partial centre-based childcare and had non-parents as primary caregivers. In EDEN, scores for this pattern were higher in children with later bedtime (only in girls) and whose mothers had lower educational attainment.

Conclusions: Three similar lifestyle patterns were observed among preschool children in Singapore and France. While some contextual factors were common across both cohorts, certain factors differed due to differences in physical environment, social and cultural settings. Findings will provide valuable information to each country on prioritizing areas for action and aid in intervention development and prevention strategies to improve the health and well-being of our children.

Lifestyle risk factors and infectious disease mortality, including COVID-19, among middle aged and older adults: Evidence from a population-based cohort study in the United Kingdom

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Special Interest Group: A. Ageing (SIG)

Purpose: In this population-based cohort study, we investigated the associations between combinations of modifiable lifestyle risk factors and infectious disease mortality, including COVID-19.

Methods: Participants were 468,569 men and women (aged 40 to 69) from the UK Biobank study. Lifestyle indexes were based on traditional and emerging lifestyle risk factors using health guidelines and best practice recommendations that included: physical activity, sedentary behaviour, sleep quality, diet quality, alcohol consumption, and smoking status. The main outcome was mortality from infectious diseases, including pneumonia, and coronavirus disease 2019 (COVID-19). Multivariable proportional hazards regression and binomial regression models were adjusted for age, sex, sociodemographics, body mass index, ethnicity, and comorbidities that included: cancer, cardiovascular disease, diabetes, chronic respiratory illness, and immune disorders.

Results/findings: During 5,166,793 person-years of follow-up (mean age = 56.5 (8.1), 54.6% female), 4,563 deaths occurred. Meeting public health guidelines or best practice recommendations among any combination of lifestyle behaviours was inversely associated with mortality. Hazard ratios ranged from 0.29 (0.26 to 0.33) to 0.66 (95% CI: 0.59 to 0.75) for infectious disease, and 0.26 (0.23 to 0.30) to 0.69 (0.60 to 0.79) for pneumonia. Among participants with pre-existing cardiovascular disease or cancer, hazard ratios ranged between 0.30 (0.25-0.34) to 0.73 (0.60-0.89). COVID-19 mortality risk ranged between 0.42 (0.28-0.63) to 0.75 (0.49-1.13). The preventable fraction was 34.8% for infectious disease, 35.6% for pneumonia, and 29.6% for COVID-19. There was limited evidence of relative excess risk due to interactions between pairs of healthy lifestyle behaviours.

Conclusions: We found a clear protective dose-response with higher lifestyle indexes against infectious disease mortality. The protective benefits conferred by different behaviours seem to be additive. Public health efforts that include improvements in lifestyle risk factors could be used as an ancillary measure to prevent infectious disease mortality.

Longitudinal associations between physical fitness components and health-related quality of life during adolescence: DADOS study

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Special Interest Group: K. Disease prevention and management

Purpose: Physical activity practice is positively associated with levels of physical fitness in youth. Prior cross-sectional research revealed positive associations between physical fitness components (i.e., cardiorespiratory fitness, muscular strength, and speed-agility) and health-related quality of life (HRQoL) in adolescents (1,2). However, only one longitudinal study investigated the association of cardiorespiratory fitness with HRQoL in adolescents (3), whereas the longitudinal association between muscular strength, and speed-agility physical fitness components and HRQoL during adolescence has not been previously investigated. The purpose of this study was to investigate the association of cardiorespiratory fitness, muscular strength, and speed-agility at baseline with HRQoL at 24-month follow-up in a sample of adolescents.

Methods: This is a longitudinal analysis with 199 adolescents (13.9 ± 0.3 years at baseline) from DADOS (Deporte, ADolescencia y Salud) study. Cardiorespiratory fitness was assessed using the 20m Shuttle Run Test. Muscular strength was assessed using the standing broad jump test. Speed-agility was assessed using the 4×10m shuttle-run test. HRQoL was evaluated using the KIDSCREEN-10 questionnaire. Linear regression analyses, controlling for sex, pubertal status, socioeconomic status, waist circumference, and baseline HRQoL were performed in order to analyze longitudinal association between fitness components and HRQoL. A p-value of $p < 0.05$ was set as statistically significant.

Results: Cardiorespiratory fitness and muscular strength at baseline were significantly associated with HRQoL at 24-month follow-up ($\beta = 0.183$, 95% CI=0.008;0.086, $p = 0.019$ and $\beta = 0.175$, 95% CI=0.008;0.075, $p = 0.014$, respectively). No significant association between speed-agility and HRQoL was found.

Conclusions: Our results revealed that the levels of cardiorespiratory fitness and muscular strength at baseline were positively associated with HRQoL at 24-month follow-up in adolescents. Current results are in line with the cardiorespiratory fitness results found in previous studies (3). These findings underline the key role of improving both cardiorespiratory fitness and muscle strength through physical activity promotion in order to increase HRQoL during adolescence.

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Maintaining physical activity through the use of digital tools for people with a long-term condition/s: A scoping review

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Special Interest Group: D. e- & mHealth (SIG)

Purpose: Physical activity (PA) is important for maintaining health and wellbeing for people with long-term conditions (LTCs). However, people with LTCs are often less active than the general population. Digital tools offer potential to support a more physically active lifestyle. They are often successful in increasing PA in the short-term but there is little evidence of their effect on longer-term behaviour change. This scoping review aimed to identify the range of existing digital tools, their theoretical foundations and components to support the maintenance of PA in people with LTCs.

Methods: The review was conducted in accordance with PRISMA-ScR guidance (1). Searches of the CINAHL, Medline, EMBASE, IEEE Xplore, PsycINFO, Scopus, Google Scholar and clinical trial databases were conducted. Initial screening of titles was undertaken by two reviewers to exclude irrelevant results. Titles/abstracts were reviewed by two independent assessors against the eligibility criteria (2), with conflicts resolved by a verifier, using the Covidence software. The review of full-texts followed the same procedure. Data extraction was undertaken by four groups of two reviewers using a charting form (modified through piloting), with discrepancies discussed.

Results: In total, 38 journal articles from 34 studies were included. The most commonly identified LTCs were cardiovascular disease, type 2 diabetes mellitus and obesity, with most studies also reporting comorbidities (n=20). Digital tools were predominantly web-based +/- wearables/activity trackers/pedometers. A wide range of maintenance periods were identified (3 – 12 months). Full descriptive results will be ready for presentation at ISBNPA 2021. **Conclusions:** This scoping review will collate and present the available literature in this area for the first time across a range of LTCs. The findings will help to identify gaps in the literature for future research and to optimise intervention components to support the maintenance of PA in people with LTCs.

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Mediators of physical activity maintenance in interventions for adults with chronic disease: a systematic review

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Special Interest Group: K. Disease prevention and management

Purpose: Physical activity (PA) is recommended as a non-pharmacologic chronic disease self-management strategy. Many interventions achieve short-term PA changes but not long-term PA maintenance. Given the possible usefulness of theory-based interventions, this systematic review examines potential theoretical mediators in PA maintenance among adults with chronic disease.

Methods: Systematic literature searches were conducted in PubMed, Embase, Web of Science, CINAHL, PsycINFO, and SPORTDiscus. Inclusion criteria consisted of 1) randomized controlled trial; 2) adults with arthritis, cancer, diabetes, or heart disease; 3) reported PA outcomes ≥ 6 months post-intervention; and 4) reported intervention effects on a theoretical construct OR effects of a theoretical construct on PA maintenance OR mediation effects of a theoretical construct between the intervention and PA maintenance. Study quality was assessed using the Cochrane Risk of Bias Tool.

Results: Thirteen studies focused on populations with arthritis (n=2), cancer (n=3), diabetes (n=4), and heart disease (n=4). Studies were medium-low quality. Sample sizes ranged from 45-543 and intervention effects on PA were maintained in 8 studies. Eight studies examined only the effects of the intervention on theoretical constructs, four examined the effects of theoretical constructs on PA maintenance, and three tested for mediation. Of the studies that achieved PA maintenance, positive intervention effects were also reported on a) self-efficacy toward PA maintenance (arthritis); b) general PA self-efficacy, self-efficacy toward PA barriers, coping with relapse (diabetes); and c) use of a PA planning strategy and PA-related goal attainment (heart disease). The use of a PA planning strategy was effective in promoting PA maintenance (heart disease). And among studies that tested mediation, the following mediated intervention effects on PA maintenance: a) self-efficacy toward PA barriers, coping with relapse, and social support, modeling, and injunctive norms from family (diabetes); and b) use of a PA planning strategy (heart disease). Among the studies where intervention effects on PA were not maintained: a) the intervention positively changed PA self-efficacy and motivational readiness (cancer) and b) PA self-efficacy and perceived barriers promoted PA maintenance (cancer).

Conclusions: We found evidence of theoretical constructs (e.g., self-efficacy, planning) that may be effective in promoting PA maintenance among individuals with chronic diseases.

mHealth Intervention Efficacy on Sedentary College Students' Physical Activity, Confidence and Motivation

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Special Interest Group: D. e- & mHealth (SIG)

Background/Purpose: Studies suggest approximately 25% to 30% of college students are overweight or obese. Therefore, implementing innovative and effective PA interventions among this population with the goal of improving their PA and psychosocial outcomes is paramount. The primary objective of this project was to investigate the efficacy of mobile app-integrated PA intervention on PA, exercise motivation and confidence in sedentary college students.

Methods: A total of 13 sedentary college students (Mage = 20.5, SD= ± 1.02; 9 women; 93% white) were recruited via flyers and emails. Participant's exercise confidence, objectively-measured PA, intrinsic and extrinsic motivation were assessed before and after this 4-week intervention. Participant's initial and postintervention PA level was determined using Tri-Axis pedometer (OMRON) Model HJ-303. Self-Regulation Questionnaire-Exercise (SRQ-E) and Exercise Confidence Survey were used to assess participants' intrinsic and extrinsic exercise motivation and exercise confidence, respectively. After the baseline assessment of participants' exercise motivation and confidence, participants' baseline 7-day PA were collected via pedometers. During the intervention, participants interacted with other participants in small groups facilitated by a research assistant once a week to discuss PA goals and barriers. Participants were also asked to interact using the mobile apps Samsung Health and Snapchat throughout the intervention. All post-assessment were conducted at the end of the 4th week.

Analysis/Results: Step counts improved from 5794 steps to 6843 steps. Paired t-test revealed that average step counts ($t(1,12) = -3.04, p < 0.05$), and exercise confidence ($t(1,12) = -3.09, p < 0.01$) significantly improved from pretest to post-test. Interestingly, results showed an increase in extrinsic motivation but decrease in intrinsic motivation, which did not reach a significant level.

Conclusions: The findings of this study suggest that use of health and social media apps combined with in-person social interaction is feasible and effective in increasing sedentary college students' steps count and exercise confidence. Although step counts significantly increased, post-intervention step count was not sufficient to meet the recommended PA guideline. For future studies, larger sample size with longer intervention period is warranted.

Mindful-Aerobic Exercise Intervention for Enhancing Physical and Mental Wellbeing Among Minority Youth: Pilot Study

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Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: Benefits of mindfulness and aerobic exercises on predominately Caucasian children's physical and mental health have been documented (e.g., Biddle et al., 2019; Garcia et al., 2019). However, scarce research in this area has involved minority children. Thus, this study aimed to test the efficacy of a 12-week mindful-aerobic exercise program in increasing moderate-to-vigorous physical activity and reducing anxiety and emotional eating among Latinx and African American youth.

Methods: 148 Latinx and African American early adolescents (Mage = 10.1 years, SDage = 1.3; 52% girls) were randomized into an experimental or comparison group. In the experimental group, participants attended two weekly 60-minute exercise group sessions of fitness yoga and kickboxing/spinning for 12 weeks. They also practiced mindful meditation and breathing exercises. The comparison group participated in a weekly 60-minute recreational play session during the same period. All participants completed pre- and post-intervention surveys, e.g., demographics, the Physical Activity/Preference Questionnaire (Kowalski et al., 2004), the Multidimensional Anxiety Scale for Children (March & Parker, 2004), and the McKnight Risk Factor Survey-IV emotional eating subscale (McKnight Investigators, 2003). To measure physical activity objectively, participants wore an accelerometer for seven days pre-and post-intervention. Participants' height, weight, and waist circumference data were taken at pre- and post-intervention. Repeated measures analysis of covariance (covariates included gender, age, and adiposity) was conducted to assess the effectiveness of the intervention in primary outcomes.

Results: According to CDC's obesity status classification, 52% fell within overweight/obese range at baseline. Participants had an average of 27.6% body fat (SD = 10.5%). Except for ethnicity, no significant differences were found at pre-test in demographics or variables of interest between the experimental and the control group. Results indicated that experimental group showed a significantly greater decrease in anxiety [$F(1,118) = 5.09$, $p = .03$, partial $\eta^2 = .04$], and emotional eating [$F(1,121) = 5.41$, $p = .02$, partial $\eta^2 = .04$] after intervention. However, pre-post intervention changes in physical activity were not significantly different between two groups.

Conclusions: These findings suggest a positive impact of a mindful-aerobic exercise intervention on anxiety, and emotional eating among Latinx and African American youth.

Nature's effect on stress and diet: a lab study and questionnaire on nature aspect differentiation and indoor nature integration

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Special Interest Group: H. Policies and environments (SIG)

Purpose: Although the health benefits of nature are well-recognised, it is still unclear which nature aspects can counteract stress and whether nature also influences eating behavior.

Methods1: Before (5min) and after (8min) the Trier Social Stress Test, 81 participants (82% women, 19-30y) saw one of the four slideshows with nature or urban environments in green or black-white shades. Group differences were tested on Perceived Restorativeness Scale, five repeated measures of heart rate variability (HRV), salivary cortisol and mood, food wanting and snack buffet consumption.

Methods: The separate online questionnaire was completed by 130 participants (40±18y, 66% women).

Results1: Reported restorative power was higher in the nature pictures than urban pictures with an even better attentional/happiness restoration capacity for green versus black-white nature (13.8±0.6 vs 11.8±0.6 on 20). Nature overall was somewhat beneficial compared to urban pictures by lower HRV and negative emotions reactivity; and the green nature group had the best happiness recovery. In food intake or wanting, no differences existed.

Results: Indoor plants had the same stress-protective scores as indoor flowers, nature sounds and nature smell but were stronger than wooden interior or nature pictures, while green interior accents/objects and fake plants were scored lowest. Still, pictures with green objects scored better than grey objects. For eating behaviour, forest smell and indoor plants were scored highest. A perceived effect of nature on stress was mentioned via fascination, green colour and 'feeling at home'. The majority did not expect an effect of nature on diet, but mechanisms via stress-reduction and nudging towards healthy lifestyle were mentioned.

Conclusions: For stress prevention, the environmental content (=nature) as such seems most important, although a green color can also help. A focus group study, a lab study on green nature indoor and nature sounds, a diary study and cohort analyses are ongoing in preparation towards an intervention.

Optimizing a scaled-up health promotion program to maintain impact at reduced cost: Choose to Move

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Special Interest Group: E. Implementation and scalability (SIG)

Purpose: To improve population health effective interventions must be scaled up and sustained. Choose to Move (CTM) is an effective, choice-based health promotion program for older adults. We are currently scaling up CTM in 4 phases (2016-2021) across British Columbia, Canada. We describe our systematic adaptation of CTM to context and delivery partner needs and resources, elsewhere. In Phase 4 we aim to optimize reach and maintain impact (retain fidelity to core functions) -- while reducing implementation costs. Our specific objectives are to: 1) describe the systematic optimization process we undertook for Phase 4 scale-up and 2) share the resulting adapted CTM model.

Methods: Using a 6-stage approach we adapted CTM implementation strategies and content for Phase 4 scale-up. When the COVID-19 pandemic struck, we made additional adaptations to comply with public health restrictions. Stage 1: reviewed existing data (feedback from CTM participants and delivery partners). Stage 2: conducted focus groups (intervention providers) and interviews (previous CTM participants). Stage 3: developed a new CTM prototype. Stage 4: validated the prototype with delivery partners. Stage 5: created a final, adapted model. Stage 6: pilot tested the model. We describe adaptations within FRAME, the updated Stirman et. al (2019) coding framework.

Results: We adapted CTM phase 4 content (added/removed/reordered elements (e.g. more group interaction; shortened program from 6 to 3 months)), context (delivery format changed), and evaluation (added/removed indicators). When COVID-19 struck we adapted the setting (virtual delivery), training and evaluation (e.g., online; added/removed indicators) and implementation strategies (e.g., virtual recruitment). We piloted the CTM phase 4 model with CTM alumni during the acute COVID-19 stage [April - August 2020]. We are currently conducting impact, implementation and economic evaluations of CTM Phase 4.

Conclusions: We share our approach to optimizing CTM as one example of a data-driven method to reduce intervention cost while striving to maintain impact. If the reduced-cost model proves effective, it may increase the reach and longevity of program delivery by enhancing sustainability.

Parental Practices Influencing Eating Behavior on Independent Eating Occasions of Early Adolescents in Hawai'i

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Special Interest Group: G. Children and families (SIG)

Purpose: Parental practices influence early adolescents' eating behaviors, and therefore play a key role in obesity prevention. During adolescence, children gain more independence. Thus, adolescents' eating behaviors, specifically making food choices without their parents' supervision, can impact their overall diet quality and health. However, there is no published evidence identifying the influence of parental practices on adolescents' food choices during independent eating occasions (iEOs) in Hawai'i. Examining whether parental practices are different for low-income households defined as below the 185% U.S. federal poverty guidelines, compared to middle- to high-income households is needed for developing tailored interventions for each population. Therefore, this study examined potential differences in parental practices as they relate to adolescents' iEOs by comparing children from different household income groups in Hawai'i.

Methods: Early adolescents (mean [SD] age, 11.40 [1.03] years; n=45) and their parents/caregivers (n=46) were recruited in O'ahu, Hawai'i, and one-on-one interviews were separately conducted for parents and children in each income group. The interview data were analyzed using the Sort and Sift, Think and Shift method.

Results: Four of the same core themes emerged from parent and child interviews: 1) Rules and Expectations, 2) Environment, 3) Teaching about Healthy Eating Behavior, and 4) Child Control, including several subthemes under each core theme. Regarding the core themes and subthemes, there was no difference in parental practices between the income groups. However, when considering one of the subthemes, "restriction" under "child control," some parents in low-income households indicated that the challenges parents face can impede positive parental practices. For instance, parents did not want their child to eat instant noodles but had difficulty restricting their child from eating it due to their busy schedules. This phenomenon was not seen among middle- to high-income households.

Conclusions: Further studies are needed to elucidate factors that may interfere with positive parental practices, as well as differences in parental characteristics such as race/ethnicity, in addition to household income. The findings may

inform the development of effective interventions for promoting healthy eating behaviors in adolescents in the target population and thus address the problem of adolescents' unhealthy eating behaviors in Hawai'i.

Parents' knowledge, attitudes and beliefs of their children's physical activity and diet: a qualitative study among parents in Singapore

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Special Interest Group: G. Children and families (SIG)

Purpose: Parents are key players in sculpting the physical activity (PA) and dietary behaviours of their children. Research in western countries has shown that parents' knowledge, attitudes and beliefs towards PA and eating do influence these behaviours in their children. In Asian countries, research on the role of parents in influencing these behaviours is minimal. This qualitative study is the first to explore parents' perspectives of their children's PA and eating behaviours in Singapore, a multi-racial country in South-East Asia.

Methods: Sixteen semi-structured in-depth interviews were conducted with parents (n=10 female, mean age: 42.4 years) recruited by convenience sampling from two primary schools in Singapore. All sessions were audio-recorded and transcribed verbatim. Data analysis was carried out by one coder, with 10% being cross-coded by a second coder, using inductive thematic analysis.

Findings: Our findings revealed that parents generally recognised the importance and benefits of PA and healthy eating for children but were unsure of local guidelines for PA and diets for children. Nevertheless, most parents felt that their children were not spending enough time on PA and have diets that are of poor nutritional quality (e.g., lacking in fruits and vegetables). To encourage healthy behaviours among their children, parents reported a variety of practices, such as providing logistical support for PA, being a positive role model, and controlling and monitoring their children's food intake. Some barriers parents faced include difficulty in persuading their children to heed their advice, physical environment concerns (e.g., hot weather and easy access to fast foods), and parents' conflicting priorities (e.g., prioritising children's academic studies over PA participation and preference for less healthy foods). While most parents perceived themselves to be primarily responsible for their children's health behaviours, several parents felt that schools should share some responsibilities, particularly for PA.

Conclusions: Our findings suggest that parents in Singapore are knowledgeable about the benefits of encouraging physical activity and healthy eating (as are parents in western countries) but are challenged by physical environmental

influences and their personal priorities and preferences. These findings can help inform the development of future school-based interventions involving parents.

Parents' perceptions of their child's movement behaviours in the midst of the COVID-19 pandemic

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Special Interest Group: G. Children and families (SIG)

Purpose: Over the past year, many Canadian children were unable to participate in recreational sports due to COVID-19 stay-at-home orders. Given the reduced programming to support physical activity (PA), and the increasingly important role of parents for encouraging movement, it is imperative to understand their knowledge of, and support for healthy movement behaviours. The purpose of this study was to investigate parents' perceptions of their child's movement behaviours and the resources they accessed to cope during the pandemic.

Methods: Parents (N = 364) from Ontario, Canada completed an online questionnaire detailing the health behaviours of their eldest child, aged 5 to 13, in summer 2020. Descriptive statistics were used to summarize parents' perceived knowledge of the Canadian 24h Movement Guidelines, children's activity levels, and resources accessed.

Results: Adequate understanding of the guidelines was reported by 48.1% of parents, with 35.2% reporting no knowledge of the guidelines. Most children met moderate-to-vigorous PA (MVPA) guidelines (86.3% on weekdays; 91.6% on weekends), but only one quarter met sedentary behaviour (SB) recommendations (25.7% on weekdays; 22.4% on weekends). Those with higher perceived knowledge of guidelines reported that their children engaged in more MVPA ($r_s = .139 - .143$, $p_s < .05$), more light PA ($r_s = .136 - .183$, $p_s < 0.05$), and less SB ($r_s = -.110 - (-.163)$, $p_s < 0.05$) on both weekdays and weekends. However, parents reported significant increases in SB compared to pre-pandemic ($t(332) = -9.58$, $p < 0.001$ on weekdays; $t(338) = -12.05$, $p < .01$ on weekends). Many parents (i.e., 72%) sought out one or more resources related to health behaviours. Of the 262 parents that used a resource, 57.6% accessed something PA-related (e.g., FitBit), and 69.1% accessed something leisure-related (e.g., Netflix).

Conclusions: Despite pandemic restrictions, parent reports suggest the majority children met PA recommendations. However, SB exceeded pre-pandemic levels with few children meeting the guidelines. While parents accessed various resources to support positive health behaviours, their reliance on leisure resources could be promoting SB. Since meeting PA guidelines may not protect against high SB, it is important to help parents understand how to limit SB in addition to promoting PA of all intensities.

Physical activity and social media use during emerging adulthood: Do exercise-related goals and desires to “stay fit and exercise” matter?

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Special Interest Group: L. Other

The use of social media has grown rapidly in the last decade, and emerging adults are particularly avid users. Fitness-based content is widely available on social media, especially image-based sites (i.e., TikTok, Instagram), and it may impact physical activity (PA). However, it is likely that this relationship depends on the extent to which an individual is interested in fitness and exercise.

PURPOSE: To examine whether social media use is associated with PA, exercising to lose/maintain weight, and exercising to improve muscle size/tone during emerging adulthood. To determine whether the association is moderated by desire to stay fit and exercise.

METHODS: Using data from EAT 2010-2018 (Eating and Activity over Time), participants (N=1428, age=22±2 years) were dichotomized as care less (CL) or care very much (CVM) about staying fit and exercising. Stratified linear and logistic regression models were assessed to determine the association between social media use with PA, exercising to lose/maintain weight, and exercising to increase muscle tone/size.

RESULTS: Emerging adults in the CL group (n=1062) and CVM group (n=495) completed 6.6±5.7 and 8.9±6.4 hours/week of PA, respectively (p<.0001). Both CL and CVM groups reported the same amount of social media use (1.9±1.5 hours/day). Participants in the CVM group were more likely to report exercising to lose/maintain weight and to increase muscle size/tone relative to CL participants. No significant associations were reported between social media with PA, exercising to lose/maintain weight, or exercising to increase muscle size/tone among emerging adults in the CL or CVM groups.

CONCLUSIONS: Emerging adults' social media use does not differ by their level of caring about fitness and exercise. Although evidence of associations between social media use with PA and exercise-related goals was not supported, this relationship must be explored further. Exposure to varying quality of fitness-based social media content with differing characteristics (e.g., body positivity) could influence this association and should be investigated to inform researchers aiming to use social media as an intervention modality.

Physical Education Teachers' Perceived Benefits, Challenges and Experiences of Delivering Muscular Fitness Activities During Physical Education: PE Teacher EmPOWERment Survey

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Special Interest Group: G. Children and families (SIG)

Purpose: School-based physical education (PE) provides a unique setting to deliver physical activities that promote muscular fitness (MF). However, such delivery may be impaired by a lack of PE teacher expertise and confidence in school-based MF activity. An understanding of teachers' thoughts and perceptions regarding the delivery of MF may help to develop teaching quality in these activities and inform intervention design to engage students in MF-promoting activities through PE.

Methods: An online survey to investigate perceived benefits, challenges and experiences of delivering MF in UK secondary school was distributed to PE teachers via Twitter. Survey responses were collected from across England, Wales, Northern Ireland and Scotland. Data were reported descriptively and differences between teaching experience and gender were analysed using log-linear regression.

Results: Completed surveys were returned by 194 teachers. Seventy-nine percent of teachers perceived MF activity as an important element of PE compared to 21% who did not ($\beta=0.86$, CI 0.04, 1.69, $p=0.04$). Assessments of MF were more likely to be conducted by teachers with 5-14 years of teaching experience ($\beta=-1.60$, CI -2.91, -0.29, $p=0.01$) and 15+ years of teaching experience ($\beta=-1.39$, CI -2.71, -0.07, $p=0.04$) compared to teachers with <4 years of experience. Only 27% teachers used MF assessments to inform programming decisions regarding future provision of MF activity ($\beta=-1.48$, CI -2.45, -0.51, $p<0.01$). Seventy-six percent of teachers suggested their knowledge of MF needed development compared to 9% who did not believe professional development was required ($\beta=2.08$, CI 1.04, 3.12, $p<0.01$). Eighty-eight percent of teachers suggested that further professional development in the teaching and assessment of MF activities would be useful ($\beta=-2.56$, CI -3.74, -1.39, $p<0.01$).

Conclusions: Teachers delivering PE from across the UK believe their knowledge of school-based MF activity requires development. A lack of knowledge in the teaching and assessment of school-based MF was demonstrated by a high number of MF assessments conducted with no subsequent informed decision-making that is required to safely and effectively teach MF activity. Provision of continued professional development is warranted to deliver successful MF interventions through PE.

Positive relationship with eating: associations with weight management and food intake

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Special Interest Group: K. Disease prevention and management

Purpose: In recent years, the idea of a positive attitude towards eating is emerging to move away from pathology, restriction, and concern related to food and eating behavior. To further investigate to which extent this positive eating attitude could be beneficial for one's health, the present study focuses on the associations between the Positive Eating Scale (PES), weight management, food intake, and body mass index with regards to sex differences within a non-clinical sample of the general Swiss population.

Methods: Data from the third (2019) and fourth (2020) waves of the Swiss Food Panel 2.0, a longitudinal paper-and-pencil survey which started in 2017, were analyzed. Participants (N2019 = 2795, N2020 = 2291) answered questions related to their positive eating attitude, food intake, eating behavior, and sociodemographic status. Correlations, logistic regressions, and linear regressions were performed.

Results: Cross-sectional results showed that variables related to food restriction and weight concern (e.g., restrained eating, weight regulation through calorie monitoring) were negatively correlated with the PES total score ($r = -.08 - -.34$, $p < .001$) and the subscale satisfaction with eating ($r = -.09 - -.45$, $p < .001$), while there were only small or no significant correlations with pleasure when eating for both sexes. Overall, diet quality was positively correlated with positive eating (total score and satisfaction with eating) for women ($r = .10$, $p < .001$). There was no such evidence found for men. Furthermore, body mass index was negatively correlated with the PES total score (men: $r = -.19$, $p < .001$; women: $r = -.18$, $p < .001$) and the subscale satisfaction with eating (men: $r = -.29$, $p < .001$; women: $r = -.25$, $p < .001$) for both sexes. On a longitudinal level, positive eating was not a significant predictor for change in diet quality. However, higher levels of positive eating significantly decreased the likelihood of being overweight after one year.

Conclusions: A positive attitude towards eating, and especially satisfaction with eating, seems to be primarily associated with a healthier food choice, better diet quality, and a lower likelihood of becoming overweight over time. Promoting a positive attitude towards food and eating might, thus, be beneficial for one's health and needs to be further explored in intervention settings.

Preferences and Engagement with Physical Activity Resources among Cancer Survivors During the COVID-19 Pandemic

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Special Interest Group: C. Cancer prevention and management (SIG)

Purpose: The COVID-19 pandemic has imposed additional barriers for physical activity (PA) in cancer survivors. Adaptations to PA programs are needed during the pandemic. Therefore, the purpose of this study was to evaluate the: 1) PA preferences of cancer survivors during the pandemic; and 2) the available resources to engage in PA during the pandemic.

Methods: Using a cross-sectional study design, cancer survivors were recruited globally through convenience sampling using Prolific (www.prolific.co; an online survey distribution tool). Cancer survivors were 18 years of age or older, have been diagnosed with cancer, and were able to complete the study in English. Cancer survivors completed a self-reported online survey addressing the COVID-19 guidelines where they live, their PA preferences, and available PA resources during the pandemic. Questions were Likert scale, closed, and open-ended questions addressing the study objectives. Descriptive statistics, including frequencies and percentages of responses, were used to determine trends in PA preferences and resources.

Results: Cancer survivors (N=511) were mainly female (n=356, 69.7%), with a mean age of 48.4±15.6 years, diagnosed with breast (n=148, 29.0%), gynecologic (n=60, 11.7%), and hematologic cancer (n=60, 11.7%), with a mean of 86.3 ± 81.8 months since diagnosis. Since the start of the pandemic, cancer survivors were primarily walking (n=419, 82.0%), preferred performing PA at home (n=238, 46.6%) or outdoors/around their neighbourhood (n=244, 47.7%), and alone (n=319, 62.4%). The majority of cancer survivors had available space to perform PA at home in their living room (n=337, 65.9%), and in their neighbourhood on sidewalks (n=320, 62.6%) and walking paths (n=275, 53.8%). The most common equipment available to survivors in their homes were free weights (n=205, 40.1%) and exercise mats (n=207, 40.5%). Few survivors were made aware of at-home PA resources (n=98, 19.2%), and approximately half of cancer survivors indicated wanting to receive at-home PA resources (n=254, 49.7%).

Conclusions: Understanding cancer survivors' preferences for PA during the pandemic and the resources they have available is critical to designing effective home-based interventions. This may lead to increased PA behaviour for better quality of life and health outcomes among cancer survivors.

Prehabilitation outcomes for intra-abdominal cancer patients: protocol for the development of a core outcome set (COS)

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Special Interest Group: C. Cancer prevention and management (SIG)

Purpose: Prehabilitation aims to optimise patients' 'readiness' for surgery by improving pre-operative health and fitness status, with a view to reducing complications and improving post-operative recovery. To evaluate the health benefits of prehabilitation, it is important to use patient-appropriate, valid and reliable measurements. However, current prehabilitation interventions are heterogeneous in design and different measurement tools have been used to evaluate efficacy and adherence. This issue of heterogeneity in outcome measurement and reporting could be reduced with the development and application of an agreed standardised set of outcomes, also known as a core outcome set (COS). The overarching aim of this project is to develop a COS for studies evaluating prehabilitation interventions in intra-abdominal cancer patients.

Methods: The protocol of this COS development study was designed by an International collaborative group of experts within the field. It adheres to the Core Outcome Set-STANDARDISED Protocol statement and is registered on the COMET database and the Open Science Framework. Stage 1 of this project is a systematic review to identify all relevant outcomes used in prehabilitation interventions in intra-abdominal cancer patients. In stage 2 a list of outcomes will be created (based on the results of the review) and categorized into specific domains (e.g. physical/psychosocial outcomes) which will be converted into an online survey. Stage 3 consists of a two-round Delphi-study (using the outcomes survey developed in stage 2), in which the outcomes will be evaluated and prioritized. Experts will have the opportunity to add additional relevant outcomes during the Delphi-study. Stage 4 of this project is a consensus meeting with all relevant stakeholders to agree on the final COS.

Results/findings: The systematic review is currently ongoing and preliminary results will be presented during the ISBNPA conference in June 2021.

Conclusions: Standardization of outcome measures will be an important step forward for clinical research studies aimed at evaluating and understanding the health benefits of single and multi-modality prehabilitation in different cancer care settings. This project will add value to the field of prehabilitation and help to define its role in cancer care.

Preliminary results of a systematic review about objective measures to assess active commuting physical activity to/from school in young people

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Special Interest Group: J. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

Purpose: Active commuting to/from school (ACS) has been associated with an increase in levels of physical activity (PA) and other health-related benefits. However, there is no consensus on the best objective methodology to assess ACS PA (ACS-PA). This study aimed to show the preliminary results of the systematic review (PROSPERO: CRD42020162004) through two objectives: (1) to identify existing studies that assess ACS-PA through objective measures and (2) to propose an appropriate methodology and practical considerations to assess ACS-PA.

Methods: A systematic search was carried out to 2020 in five different electronic databases (PubMed, Web of Science, SPORTdiscuss, Cochrane Library, and National Transportation Library) following the PRISMA and PICO(S) strategies. The inclusion criteria were (1) studies with young people who ACS in free-living conditions, (2) the language of the studies had to be English or Spanish, (3) studies had to assess ACS-PA through objective measures, and (4) ACS-PA had to be reported. Furthermore, the risk of bias and quality assessment were evaluated.

Results: Although in the initial search, 3.224 references were identified, only 26 studies met the inclusion criteria. The preliminary results of this systematic review suggested that 92% of the identified studies assessed ACS-PA through accelerometers, and only 8% of the studies used pedometers. Furthermore, 72% of the studies have used an interval time (ranged from 1 to 4 hours) to assess ACS-PA, and only 18% of the studies combined accelerometer and Global Positioning System to assess ACS-PA. Regarding the data collection of accelerometers, most of the studies placed the device in the right hip, used cut-off points proposed by Evenson for moderate to vigorous PA and Troiano for non-wear time definitions, and the registration period protocol was set in 7 days. However, other data collection such as epoch, valid day, valid week, and frequency (hertz) presented a greater heterogeneity of criteria among the different studies.

Conclusions: This systematic review will provide an overview of the most used objective measures in the scientific literature, and practical applications of the most suitable processes to data collection for objectively assess ACS-PA.

Process evaluations of early childhood obesity prevention interventions delivered via telephone or text messages: A systematic review

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Special Interest Group: D. e- & mHealth (SIG)

Purpose: Increasingly, public health interventions are delivered via telephone and/or text messages. Recent systematic reviews of early childhood obesity prevention interventions have not adequately reported on the way interventions are delivered and the experiences/perceptions of stakeholders. We aimed to summarise the literature in early childhood obesity prevention interventions delivered via telephone or text messages for evidence of application of process evaluation primarily to evaluate stakeholders' acceptability of interventions.

Methods: A systematic search of major electronic databases was carried out using the Population, Intervention, Comparison, Outcomes framework. Studies were included if interventions were delivered via telephone/text messages; aimed at changing caregivers' behaviours to prevent early childhood obesity; with one or more outcomes related to early obesity risk factors such as breastfeeding, solid feeding, tummy time, sleep and settling, physical activity and screen time; published from inception to May 2020. All eligible studies were independently assessed by two reviewers using the Cochrane Collaboration tool for assessing risk of bias. Qualitative studies were assessed using the Consolidated Criteria for Reporting Qualitative Research and Standards for Reporting Qualitative Research tools.

Results: Twenty-four studies were eligible, and the overall risk of bias was low. Eight studies (33%) had evidence of process evaluation that examined participants' perceptions of interventions. Participants appreciated the convenience of receiving interventions via telephone or text messages. 63% of all studies in this review showed improvement in one or more behaviours related to childhood obesity prevention. Participants were likely to modify behaviours if they received information from a credible source such as from health professionals.

Conclusions: There is limited reporting of stakeholders' experiences in early obesity prevention studies delivered by telephone or text messages. Only one-third of studies examined participants' acceptability and the potential for delivery of childhood obesity prevention interventions conveniently using this mode of delivery. Interventions delivered remotely via telephone or text messages have the potential to reach equal or a greater number of participants than those delivered via face-to-face methods. Future research should build in process evaluation alongside effectiveness measurements to provide important insight into intervention reach, acceptability and to inform scale up.

Processing conflicting information: An integrated approach to lay people's processing of conflicting health and nutrition information

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Special Interest Group: L. Other

Purpose: There is a burgeoning amount of evidence on the presence of conflicting health and nutrition information, and a general consensus that the perception of conflicting health information can have adverse effects which may go beyond the current issue and carry over to other topics, perceptions, beliefs and behaviours. However, despite this awareness, very little theoretical knowledge exists on the underlying causes and effects, and the factors that determine the process. The aim is to develop a framework that assists in understanding how consumers handle and process conflicting health information.

Methods: We derive the framework through a literature review and integration of concepts from various disciplines. Insights from fields such as multiple document processing, consumer decision making and the public understanding of science are interpreted, integrated and applied to the health and nutrition context. In the present paper, a model is described that adds to the literature and extends other frameworks by bringing together theoretical conceptions about processing pathways and strategies, in addition to seeking to identify and categorise the determinants that influence the processing of conflicting health information.

Findings: An integrated framework is proposed that identifies stages, paths, strategies and determinants related to processing conflicting information and aims to improve its conceptual understanding. A useable structured presentation of the determinants is proposed. We identify modifiable characteristics of the reader and propose the importance of the reader's beliefs about knowledge, how knowledge is constructed, and why and how experts may disagree with one another and conflicting information may arise. Lastly, we describe the implications of our framework and how this may inform further research and practice.

Conclusion: A framework is proposed to facilitate an understanding of the underlying mechanisms of the processing of conflicting health information. The framework may support future research and practice, e.g. in nutrition literacy.

Promoting child physical activity and father involvement through Parks and Recreation: a pilot study protocol

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Special Interest Group: G. Children and families (SIG)

Purpose: Fathers have a positive influence on their children's physical activity, yet are underrepresented in family-based physical activity interventions. To address this gap, we will pilot test Active Dads, a physical activity promotion program delivered through Parks and Recreation (P&R) for fathers/father figures and children ages 2-5 years.

Methods: The 8-week Active Dads program was developed by our team and a local P&R organization using the Integrated Model of Physical Activity Parenting, Social Cognitive Theory and the programmatic expertise of the P&R partners. Each session will include a brief education session for fathers and organized activities for fathers and children to promote co-participation in activity. Families will also receive personalized feedback on their activity before and after the program and a home toolbox with educational materials and play equipment. To align with the mission and seasonal structure of P&R, we have developed and will test three adaptations of Active Dads: fitness (Spring), fitness + positive parenting (Summer), and activity + outdoor education (Fall), using non-randomized, quasi-experimental single and between cohort designs. Father-child dyads (n=45; 15 per program) will be recruited using social media and community postings. The primary outcome is feasibility, defined by five criteria: meeting recruitment goals, maintaining 70% attendance, child engagement in activity during programming, fathers' satisfaction with the program, and obtaining 90% of measures. Feasibility will be assessed using a combination of process measures, observations, surveys, and semi-structured interviews. Secondary outcomes include changes in accelerometer measured father and child physical activity and fathers' self-reported involvement and activity parenting. Descriptive statistics will be used to summarize feasibility outcomes and linear mixed models will be used to evaluate changes in secondary outcomes.

Results/findings: Recruitment and program delivery will begin in March 2021, with preliminary data available by June 2021 and completion of the study in December 2021.

Conclusions: Findings from this novel pilot study will provide evidence for the feasibility of engaging fathers in young children's physical activity. Additionally, partnering with P&R represents an innovative, sustainable, and scalable model for the delivery of family-based physical activity promotion focused on fathers and their young children.

Promoting cycling for transportation: leveraging behaviour change theories and communication principles to design public health interventions

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Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: To date, interventions aimed at promoting active transportation showed limited impact. As a result, there was a recent call to examine theory-based factors associated with this behaviour. Currently, behaviour change theories do not include constructs related to the environment and communication principles such as segmentation are seldom applied to design interventions. The aim of this study was to identify the determinants of cycling to commute to work using a theoretical and communicational perspective.

Methods: This study is a secondary analysis from a larger experimental study aimed at testing messaging strategies to promote cycling to commute to work. Since no effect of the study conditions was observed on follow-up cycling, data were pooled to predict the behaviour. Cycling for transportation (at least once/week vs none) as well as constructs from the theory of planned behaviour and the norm activation model were assessed by a baseline questionnaire. The follow-up behaviour was assessed three weeks later. To perform the segmentation analysis, stratified analyses were conducted among participants who lived within a distance of 10 km from their workplace (n = 125) and those who lived farther (n = 187). All analyses were controlled for sex, education and annual household income.

Results/findings: Results from the logistic regression analyses showed that intention (OR=41.4, 95%CI: 6.5-263.9) and awareness of consequences regarding car use and air pollution (OR=5.5, 95%CI: 1.0-29.0) predicted participants' follow-up behaviour among those who lived within a distance of 10km from their workplace. Among those who lived farther, only perceived behavioural control (OR=33.7, 95%CI: 3.0-374.0) predicted cycling at follow-up.

Conclusions: The segmentation approach adopted in the present study highlights significant variations in the patterns of behavioural prediction. Hence, public health interventions should focus on different strategies according to the geographical situations of individuals. For example, using a fear-based approach that highlights the negative consequences of using cars on air quality is not likely to prompt this behaviour among individuals who live far from their workplace. Among this specific segment, interventions should rather focus on developing self-efficacy to cope with barriers.

Promoting physical activity in primary school children: a scoping review to characterize and evaluate interventions from the last decade according to the Health Promoting Schools Framework

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Special Interest Group: F. Early care and education (SIG)

Purpose: Many primary school-based interventions to increase physical activity (PA) and cardiorespiratory fitness (CRF), or to reduce sedentary behaviour (SB) have been undertaken in the past decade. The Health Promoting School (HPS) framework postulates a whole-school approach, encompassing the individual, environmental and structural level. Our aim was to characterize interventions from the last decade by features of the HPS framework and to provide an explorative overview of their effectiveness. We hypothesized that addressing more HPS features would increase effectiveness.

Methods: A systematic electronic search of six databases was combined with a hand search of reference lists to retrieve studies published between 2010 and 2019. Arksey and O'Malley's scoping review methodology framework guided the conduct of this review. Data extraction included information on study and intervention characteristics, statements of effectiveness on PA, SB and CRF outcomes from study authors, and HPS features addressed.

Results: 178 interventions were included. 47% (n=84) addressed only one feature of the HPS framework. 'Health skills and education' (n=104, 58%) was the most frequent feature followed by 'Links with parents or community' (n=95, 53%); both were also most often combined (n=25, 14%). The features 'Healthy school policies' and 'Access to (school) health services' were rarely addressed (n=13, 7% and n=4, 2%, respectively). None of the interventions encompassed all six features. Theory-based interventions, compared to interventions without a stated theoretical basis, were deemed more often effective (e.g. for CRF: 68% vs. 26% success rate). Interventions that addressed more than one feature of the HPS framework did not seem to be more effective.

Conclusions: Most interventions targeting PA, CRF and SB in primary school children were single feature interventions. For certain feature combinations, the number of studies was limited, however, no specific feature combination seemed to be associated with superior effectiveness. Theory-based interventions seem to have a higher potential to be effective. Based on our findings, we recommend a) utilizing theory-based interventions, b) further exploring combinations of HPS features, c) exploring the potential of features that have not been addressed extensively, and d) recognizing that interventions addressing multiple features are not necessarily more effective than single feature interventions.

Protocol for a real-world trial of implementing a school-and-family based obesity prevention program in primary schools

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Special Interest Group: G. Children and families (SIG)

Children's energy-balance related behaviors (EBRBs) are embedded in different social environments, most importantly family and school. Therefore, effective obesity prevention need to address both environments simultaneously. Although schools are appropriate to reach children and implement obesity prevention programs, school-based programs often fail to include families. The Family+ project (funded by Federal Ministry of Health, Germany) focuses on the link between school and family environment as part of a school-based intervention. The aims are twofold: a) develop school-and-family intervention practices and implementation strategies, and b) implement and evaluate the intervention practices and implementation strategies in three model regions.

An uncontrolled effectiveness-implementation hybrid trial will be conducted in a real-world context. We apply a mixed-methods approach and include stakeholders, teachers, and families in a reflective participatory process of modifying and adapting intervention practices and implementation strategies. The project comprises four phases: 1) development of intervention practices and implementation strategies (guided by intervention and implementation mapping protocol), 2) pilot study and participatory adaptation of interventions and implementation (guided by COM-B), 3) implementation and evaluation of effectiveness and implementation (evaluation framework of Proctor et al.) applying a pre-post design, 4) dissemination of the results by translating the findings in a reflective participatory process into an e-learning module. Nine primary schools from three model regions in Germany participate in the project. Phase 1 will be finished in April 2021. To date, we conducted network analyses and qualitative interviews with family experts, and school principals. In the next step, focus group interviews will be conducted with local stakeholders. All interviews will be transcribed verbatim. Transcripts will be analyzed following content analysis principles aiming to identify categories of needs of the implementing schools as well as perceived barriers of implementation from the perspective of different stakeholders.

Family+ provides evidence for improving the school-family partnership with regard to obesity prevention and changing EBRBs. The project combines a theory and evidence based approach with a reflective process of translation and implementation in a real-world setting including stakeholders and participants. The results will inform the development of effective school-based interventions involving parents and the implementation in research and real-world settings.

Quantifying the health and economic impacts of meeting the Global Action Plan for Physical Activity Target

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Special Interest Group: E. Implementation and scalability (SIG)

Purpose: The World Health Organization launched the Global Action Plan for Physical Activity (GAPPA) in 2018, which set a global target of a 15% reduction in the prevalence of physical inactivity by 2030. This target, however, could be achieved in various ways. The purpose of this study was to examine the health impact of different approaches to meeting the GAPPA Target.

Methods: We use an established multi-state life table model to estimate the health and economic gains that would accrue over the lifetime of the 2011 New Zealand population if the GAPPA target was met under two different approaches: (1) an equal shift approach where physical activity increases by the same absolute amount for everyone; (2) a proportional shift approach where physical activity increases proportionally to current activity levels.

Findings: An equal shift approach to meeting the GAPPA target would result in 197,000 health-adjusted life-years (HALYs) gained (95% uncertainty interval (UI) 152,000 – 246,000) and healthcare system cost savings of US\$1.57b (95%UI \$1.16b - \$2.03b; 0% discount rate). A proportional shift to the GAPPA target would result in 158,000 HALYs (95%UI 127,000 – 194,000) and US\$1.29billion (95%UI \$0.99b to \$1.64b) savings to the healthcare system.

Conclusions: Achieving the GAPPA target would result in large health gains and savings to the healthcare system. However, not all population approaches to increasing physical activity are equal – some population shifts bring greater health benefits. Our results demonstrate the need to consider the entire population physical activity distribution in addition to evaluating progress towards a target.

Reaching parents for children's health promotion and prevention: An exploratory approach to shed light on the problem to involve parents into school-based obesity prevention programs

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Special Interest Group: G. Children and families (SIG)

Schools are considered as a key setting for childhood obesity prevention and appropriate to reach children for programs aiming to change energy-balance related behaviors. However, effectiveness of school-based programs is low, regarding behavior and BMI changes. An explanation could be that parents and family environment are rarely included. In addition, strategies to enhance the engagement of parents are lacking and knowledge regarding barriers and beneficial factors is incomplete. This study examines how families can be reached, applying a qualitative approach.

In a first step one-on-one semi-structured telephone interviews are conducted with family experts, such as social and community workers, teachers and principals, staff of family-centers and nurseries. Participants shared their experience regarding: problems to reach the families, needs and barriers of families in the communication with schools and reaching especially those families that are hard to reach. In a second step semi-structured interviews will be conducted with families to gather information on their experiences and perceived barriers to participate in health promotion programs and what might be a reason why they do not attend. All interviews will be recorded and transcribed verbatim. To date five interviews with family experts and eight interviews with principals of participating schools were conducted and transcribed. The interviews lasted on average 30 minutes. The recruitment of participants will be guided by the principle of theoretical saturation. Transcripts will be systematically analyzed using MAXQDA, following content analysis principles with a combination of inductive and deductive analysis. Theoretical considerations will provide a first set of categories according to which statements will be coded. New categories formed by the content will also be included. The study aims to shed light on the problem to involve parents into school-based obesity prevention programs. Gaining knowledge regarding psycho-social, socio-cultural, environmental, and program related barriers as well as beneficial factors of involving parents is crucial to enhance the effectiveness of school-based obesity prevention programs. Based on the identification of those barriers and beneficial factors, innovative strategies to enhance the reach and involvement of parents could be developed and integrated into school-based obesity prevention programs.

Relationship between food literacy and health literacy among older people in Germany

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Special Interest Group: A. Ageing (SIG)

Purpose: Health literacy (HL) entails people's knowledge, motivation, and competences to access, understand, appraise, and apply health information necessary to make appropriate health decisions during the life course. Food literacy (FL), a subset of HL, refers to people's knowledge and competences to meet the complex demands of a healthy and sustainable diet.

HL was demonstrated to be limited among adults in Germany aged 65 and over (Hurrelmann et al., 2020). Furthermore, almost every second adult between the ages of 60 and 69 has limited FL (Kolpatzik & Zaunbrecher, 2020). Despite this, there is a conspicuous lack of studies that have examined the relationship between older people's FL, HL, and nutritional behavior in more detail. Here, we report on a study that aims to shed light on this relationship.

Methods: The baseline data of 119 individuals from the "GUSTO" intervention study were used for this analysis. FL and HL were measured using a German version of the Self-Perceived FL Scale (Poelman et al., 2018) and a German version of the HLS-EU-Q16 questionnaire. The nutritional behavior was exemplified by the daily fruit and vegetable consumption as well as the daily drinking quantity. We examined anticipated associations between the FL score and the following characteristics: HL, gender, chronic diseases, educational level, daily fruit and vegetable consumption and daily drinking quantity.

Results/findings: We observed the anticipated positive association between the FL scores of 97 participants (mean age: 72.2 ± 6.8 years, male: 27.8%) and the ascending ordered alternatives of their HL score (inadequate, problematic, sufficient, and excellent). In addition, we identified a significant difference in FL scores between their gender, chronic diseases and fruit and vegetable consumption. However, we could not find a significant difference in FL scores between their educational level, as evidenced in health literacy, and daily drinking quantity.

Conclusions: The FL score is associated with the HL score. Nevertheless, discrepancies regarding sociodemographic characteristics suggest that FL and HL cannot be considered analogously. This study is a first step towards closing the current gap in research on the relationship between FL, HL, and nutritional behavior. However, more research is needed in this field.

Relative importance of determinants of changes in eating behavior during the transition to parenthood: priorities for research and interventions

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Special Interest Group: G. Children and families (SIG)

Purpose: Understanding the relative importance of determinants of changes in eating behavior throughout pregnancy and postpartum is crucial when developing interventions aiming to improve eating behavior in this lifechanging phase. We aimed to investigate to what extent determinants of changes in eating behavior affect expecting and first-time parents' eating behavior, taking sex into account. A second aim was to involve experts in the field of maternal health and/or nutrition/physical activity and/or public health prioritizing the determinants.

Methods: A list of 54 determinants was rated by first-time parents on a scale of 1 (no impact) to 10 (very high impact). Descriptive statistics were used to describe each determinant, independent samples t-tests to examine sex differences. Experts rated the determinants on a level of modifiability, relationship strength and population-level effect, after which a 'priority for research'-score was generated based on these ratings.

Results: During pregnancy, the top three determinants receiving the highest scores for women were at the individual level, namely 'health concerns', 'physiological changes' and 'fatigue'. For men the three most important determinants were at the individual level, namely 'health concerns' and 'health consciousness', and at the interpersonal level, namely 'influence of the pregnant partner'. Postpartum, the three highest rated determinants by women were related to the baby (interpersonal), namely 'adaptation to the rhythm of the baby', 'baby becomes priority' and 'practical constraints because of the baby'. For men, 'adaptation to the rhythm of the baby' (interpersonal) received the highest score, followed by 'fatigue' and '(lack of) anticipation' (both at the individual level). According to the experts, the determinants 'professional support' (interpersonal), 'food knowledge' (individual) and 'home food availability' (environmental) were of highest priority for both sexes and during both periods, as these were rated as highly modifiable, strongly related to eating behavior and having a high population-level effect.

Conclusions: During pregnancy and postpartum, research priority should go to interventions supported through health professionals, aimed at both parents, and with a focus on food and health education. Postpartum, an additional focus towards supporting balance between one's own health and care for the baby is advised.

Relative validity of a food frequency questionnaire for dietary factors in children and adolescents to be used in a bone sarcoma study

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Special Interest Group: J. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

Purpose: Dietary factors play a major role in the development of cancers, however little is known regarding the impact of nutrition on bone sarcomas in children and adolescents. This study aimed at evaluating the relative validity of a Food Frequency Questionnaire (FFQ) to measure the consumption of foods in comparison with a 3-days diet diary in a healthy student population aged between 12 and 17 years in Italy.

Methods: An extended version (including food groups for children) of the semi-quantitative FFQ used in the European Prospective Investigation into Cancer and Nutrition (EPIC) was administered. The validity of the FFQ was assessed by comparing the intakes from the FFQ against the 3-day diary method (non-consecutive days), collected in 2019. In total, 254 subjects were included in the analyses: 128 females and 126 males, 116 from High School, 138 from Middle School. Spearman correlations adjusted for within-person variability were calculated.

Results/findings: Mean and median intakes are overall higher in the FFQs than in the food diaries. Correlations were highest for legumes, vegetables and coffee/tea (>0.5), followed by potatoes, meat, fruits, breakfast cereals, biscuits and candies and milk/yoghurts (>0.4). Moderate correlations were found for Alcoholic drinks, Soft drinks, juices, and grains (including pizza) (>0.3). For some food groups, such as fish, potatoes and bread, these moderate correlations tend to become higher when stratifying the analyses for age group. During a focus group meeting with the researchers involved in the fieldwork, it was specified that students had more difficulties in completing the 3-day diaries than in completing the FFQ, what may have impacted the relative validity results.

Conclusions: Correlations between the FFQs and food diaries were acceptable for frequently consumed foods and for most infrequently consumed foods after adjustment of the variance ratio of the three day diaries. This demonstrates that the adapted EPIC COS FFQ which has originally been developed and validated for use in Italian adults is also appropriate and well understood by Italian children and adolescents. This FFQ will be used in individuals at least 12 years old who are included in a case control study among bone sarcoma patients.

Revisiting Children's Summer Weight Change in the Early Childhood Longitudinal Study Kindergarten Class of 2010-2011

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Special Interest Group: I. Socio-economic inequalities (SIG)

Purpose: A classic paper examining the summer weight gain phenomenon in children (6-11 yrs.) utilized the Early Childhood Longitudinal Study Kindergarten Class of 2010-2011 (ECLS-K:2011) to estimate accelerated summer body mass index (BMI) gain. Height and weight measurements were collected from October-November each Fall and February-March each Spring. This is problematic because estimating school and summer BMI change requires measures be taken as close to the beginning and end of the school year as possible. To account for this, complex analytical methods were used to predict August and May BMI of students that were not measured during those months. The use of BMI z-score (zBMI) is generally considered a better measure of body composition in children. The current study aimed to replicate the findings of past work using BMI and zBMI change in children whose height and weight measurements were collected during August/September and April/May.

Methods: Height and weight were measured in the Fall and spring of each school year (2010-2013). Mixed-effect regression analyses estimated differences in monthly change in BMI and zBMI between the summer and school year. Models also examined differences in the magnitude of BMI and zBMI change between the summer and school year by race/ethnicity, income, and locality.

Results: A total of 3,926 children (48% female, 55% non-white) were included. Monthly change in BMI and zBMI during the school year was 0.024 (SD=0.136) and 0.003 (SD=0.082), respectively. Monthly change in BMI and zBMI during Summer was 0.041 (SD=0.191) and 0.002 (SD=0.098), respectively. Children who were low-income, Hispanic, and lived in suburban areas experienced accelerations in BMI change of 0.193 (95%CI=0.024,0.363), 0.149 (95%CI=0.001,0.297), and 0.223 (95%CI=0.097,0.350), respectively during the Summer compared to the school year. No accelerations in zBMI were observed during the Summer for any subgroups.

Conclusions: Findings were consistent with past studies that examined accelerated summer BMI gain. However, while BMI gain accelerated during summer, zBMI change did not accelerate. Studies explicitly designed to measure changes in body composition over the summer are needed. These studies should incorporate appropriate measures of BMI, and alternative measures of body composition (e.g., bioelectrical impedance).

School-Based Interventions for Promoting Physical Activity Using Games and Gamification: Preliminary results of a Systematic Review

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Special Interest Group: J. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

Purpose: Promoting physical activity to improve the health of the young people, is a main priority among school-based interventions. Nevertheless, there is little information about the implementation of games and/or gamification to promote physical activity within the school. Recently, our research group have published a systematic review protocol that has been registered in the International prospective register of systematic reviews (ID: CRD42019123521). Therefore, the aim of this study is to describe the preliminary results of the systematic review of school-based interventions for promoting physical activity in pre-schoolers, children, and adolescent students using games and/or gamification.

Methods: A systematic search was carried out up to August 2020 in several scientific databases (i.e., PubMed, Web of Science, SportDiscus, Cochrane Library, ERIC, and PsycINFO). A standardized procedure was conducted following the PRISMA-P and the PICO(S) strategies. The inclusion criteria were (a) to report physical activity as a primary or secondary outcome; (b) to implement a game and/or gamification intervention within the school; (c) intervention studies where a game and/or gamification were included with the learning objective; (d) to target pre-schoolers, children, and/or adolescent students (non-university students); and (e) to be written in English or Spanish. Detailed information from each study was extracted, and additional quantitative and qualitative assessments were performed.

Results: The preliminary results identified a total of 2.105 manuscripts, and only 38 studies of these met the inclusion criteria. The total sample of these studies were 8.921 participants with less than 30% pre-schoolers, more than 60% children and less than 10% adolescents. The instruments to assess physical activity were around 30% accelerometers, more than 25% questionnaires, less than 15% pedometers, and less frequently direct observation tools or mobile applications or others. Most of the identified studies were rated as low quality interventions because they were not RCTs, the effect size was not calculated, they did not include control group or they considered short intervention periods. However, some interventions were rated as good quality studies.

Conclusion. The data provided from this systematic review will allow to set the main elements for designing effective interventions to promote physical activity through games and/or gamification.

Schools' opportunities and facilitators for implementing school-based interventions aimed at healthy weight development among 6-15-year-olds: a qualitative study among central and local school managers in the region of Southern Denmark

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Special Interest Group: E. Implementation and scalability (SIG)

Purpose: Many school-based interventions are poorly implemented and sustained which challenge intervention effectiveness. Knowledge of schools' opportunities and barriers for implementation prior to implementation may guide the selection of appropriate implementation support strategies. We explored schools' opportunities and barriers for implementing universal school-based interventions aimed at promoting healthy weight among 6-15-year-olds in the municipalities of the region of Southern Denmark.

Methods: In nine municipalities, we conducted individual telephone interviews with central school managers (N=9). In three municipalities we conducted a focus group (N=15) consisting of 1) five local school managers from different schools, 2) the central and local school manager, the health nurse, a member of the school board, and the manager of the after-school-program. All interviews were recorded and transcribed verbatim. We conducted thematic analysis, following 6 steps: 1) Familiarization with data, 2) generating of initial codes, 3) searching for themes, 4) reviewing themes, 5) defining and naming themes, 6) producing the final report. The analysis draws on concepts inspired by Sccacia et al.'s (2015) aspects of organizational readiness e.g. the daily operation of the organization, knowledge and skills needed for a specific intervention and the motivation for the intervention.

Findings: Facilitators for implementation included good internal cooperation, cooperation with local sports clubs, a high political priority of aspects of healthy weight development, especially movement during the school day, and relevant knowledge, and skills. Moreover, the informants appreciated opportunities for local adaptation, a plan for sustainability, networking, capacity-building, and involvement of teachers, students, and parents in intervention development. Barriers included poor or lack of cooperation between different professional groups e.g. school staff, and consultants of both the school and health area, limited resources, and project fatigue.

Conclusions: Schools have different opportunities for implementing interventions and therefore different support needs. Schools' adoption of school-based interventions aiming at promoting healthy weight among children may be motivated by involvement of different stakeholders in intervention development, establishment of cross-functional networks, and that the intervention can be adapted locally and integrated into the existing school practice.

Self-reported health, health behaviours, and psychological wellbeing among university students during the COVID-19 pandemic

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Special Interest Group: L. Other

Purpose: As a result of the COVID-19 pandemic, university students are facing new and unprecedented challenges which may impact their health and wellbeing. The purpose of this study was to examine the self-reported health, health behaviours (physical activity, screen time), and psychological wellbeing of university students during the early stages of the COVID-19 pandemic in Ontario, Canada. A secondary objective was to examine how gender, age, and education level (i.e., undergraduate vs. graduate) were related to health status, health behaviours, and psychological wellbeing.

Methods: University students were recruited to complete an online survey at the beginning of the COVID-19 pandemic in Ontario (March–April, 2020). Multiple online recruitment strategies (e.g., social media, mass email) were used, and students were eligible to participate if they were enrolled as an undergraduate or graduate student at a university in Ontario, Canada. Self-reported data pertaining to health status, moderate-to-vigorous physical activity (MVPA), screen time, and psychological wellbeing were collected. Descriptive and regression analyses were completed.

Results: Results from 2,008 university students (Mage = 22.4, SD = 4.8, 79.3% female) showed that 69.0% of students reported good or very good health. Only 5.5% of students reported levels of MVPA that met or exceeded Canadian physical activity guidelines, and 51.2% reported 5-8 hours of recreational screen time per day. With regard to psychological wellbeing, 59.8% of university students reported depressive symptoms and 47.2% of students reported anxiety symptoms. Regression analyses revealed that females and younger university students reported significantly higher levels of anxiety and depression than males and older students ($p < .05$), while males, younger students, and undergraduate students reported significantly better health ($p < .05$). Screen time was significantly higher among males and younger university students than for females and older students ($p < .05$).

Conclusions: These results suggest that the health behaviours and psychological wellbeing of some university students might have been negatively impacted at the start of the pandemic. This study provides important information for understanding the potential impact of COVID-19 on university students. Future research directions and implications for young people will be discussed.

Shifting from tokenism to meaningful adolescent participation in research for obesity prevention: a scoping review of 71 studies

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Special Interest Group: G. Children and families (SIG)

Purpose: Development of poor diet and physical inactivity in adolescence, increases the risk of obesity and its related comorbidities in adulthood. Adolescents account for 16% of the global population yet are seldom involved in decision-making regarding research designed to support them to reduce risk factors and to prevent obesity. Traditionally adolescent participation in research has been tokenistic in nature, however, engaging adolescents in meaningful decision-making enhances research translation. The aim of this review was to analyse the current mode of adolescent participation in obesity-related research.

Methods: A systematic scoping review was conducted using the Arksey and O'Malley's 6-stage framework for scoping reviews. Six major databases were searched for peer-review primary research studies with adolescent (10-24 years) participation related to physical activity, diet, overweight and obesity or obesity-related chronic disease prevention. Studies published in all languages and countries were considered. Studies published prior to 1995 were excluded. The mode of adolescent participation in the research cycle was classified into consultative, collaborative, or adolescent-led using the Lansdown-UNICEF Conceptual Framework. The NHMRC consumer engagement framework defined the degree of involvement in the research cycle.

Results: The selection process identified 127 papers describing 71 unique studies. Of these 69% took place in the USA and 73.2% were conducted in minority or underserved communities. Gender differences observed between studies included under-representation of males in 50.7% of studies in contrast to females under-represented in 10% of studies. The mode of adolescent participation varied between studies, in 86% (61/71) of studies participation was either consultative or collaborative, while only 8.5% (6/71) involved an adolescent-led approach, giving adolescents autonomy and control over research processes and outcomes. Furthermore, 87% (62/71) of studies incorporated adolescent participation in one or more of the formative phases of the research cycle, such as relationship building, needs assessment, research idea development and project design. Only 11% (8/71) of studies involved adolescents in all stages of the research cycle.

Conclusions: Meaningful and inclusive adolescent participation in the obesity prevention research cycle is limited. Empowering and mobilising equal partnership with adolescents should be at the forefront of all adolescent-related obesity prevention research.

SMART STEP - SMARTphone-driven exercise and pedometer-based STEP intervention to promote physical activity among desk-based employees: Study protocol for a three-arm cluster randomized controlled trial

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Special Interest Group: D. e- & mHealth (SIG)

Background: Prolonged sitting in desk-based office workers is found to be associated with increased cardiometabolic risk and poor cognitive performance. Technology-based physical activity (PA) interventions using smartphone applications (SmPh app) to promote PA levels might be effective in reducing cardiometabolic risk among the sedentary population but the evidence remains inconclusive.

Objective: The objective is to investigate the effects of a technology-based PA intervention compared to PA education with a worksite manual or no intervention on PA levels, cardiometabolic risk, cognitive performance, and work productivity among desk-based employees.

Methods: A three-arm clustered randomized trial will be conducted. The study will be conducted among various administrative offices of a multifaceted university in India. Desk-based employees aged between 30 and 50 years (n=159; 53 in each arm) will be recruited. Employees from various constituent institutions (clusters) of the university will be randomized into one of the three following groups - SMART: SmPh app-driven break reminders (visual exercise prompts) plus pedometer-based step intervention, TRADE: worksite PA education with a manual plus American College of Sports Medicine guided PA prescription, or CONTROL: usual workgroup. At baseline and after the 1st, 3rd and 6th month of the trial period, accelerometer-measured sitting time and PA levels, cardiometabolic risk (fasting blood glucose, triglycerides, insulin, blood pressure, heart rate variability, functional capacity, and subcutaneous fat), cognitive performance (executive function), sickness absenteeism and work limitations will be assessed by a blinded assessor. Therapist delivering interventions will not be blinded.

Conclusions: This trial will determine whether a combined SmPh-app and pedometer-based intervention is more effective than education or no intervention in altering PA levels, cardiometabolic risk and cognitive performance among desk-based employees in India. This study has the potential to foster institutional recommendations for using SmPh-based technology and pedometers to promote PA at work.

Social network effects on child self-reported physical activity at summer care programs

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Special Interest Group: F. Early care and education (SIG)

Purpose: Summer is a time of reduced physical activity (PA) for children; however, summer care programs (SCPs) can provide opportunities for children to be active and foster friendships. In the US, 14.3 million youth attend summer programs each summer. Children from low-income families were more likely than others to attend these summer programs providing an access point to potentially lessen health disparities seen in these populations. Because child PA is greatly impacted by their social network, this presentation uses social network analysis to investigate associations between PA and friendship formation among children at SCPs.

Methods: Children (ages 8-12 years old) from two SCPs reported demographics, PA, and skill competency, at the beginning (time 1) and end of summer (time 2). Children indicated up to five people they interacted with the most while at the program. Exponential random graph modeling determined significant factors associated with the presence of friendship ties at each time point and separable temporal exponential random graph modeling determined significant changes between time points.

Results: Children ($n=166$) who reported more PA were more likely to receive connections ($PE=-0.24$, $SE=0.12$), but less likely to send connections ($PE=0.59$, $SE=0.16$) at time one. At site one, children were significantly more likely to form connections with those who reported similar levels of PA ($PE=0.16$, $SE=0.08$). However, children at site two were significantly more likely to form connections with those who differed from themselves in reported PA ($PE=0.26$, $SE=0.12$) and maintain connections with those who reported similar levels of PA ($PE=-0.78$, $SE=0.39$). Additionally, children at site two were significantly more likely to maintain outgoing connections if they reported more perceived skill ($PE=0.71$, $SE=0.35$), and incoming connections if they reported more PA ($PE=0.89$, $SE=0.40$).

Conclusions: Overall, self-reported PA was a significant factor associated with the social connections reported at these programs, which aligns with literature on social connections in schools and after-school programs. A further understanding of the social dynamics underscoring the maintenance of PA behaviors during summer may improve the odds children engage in the recommended amounts of PA during this crucial time.

Social-ecological predictors of television viewing time in women from socio-economically disadvantaged neighbourhoods: A five-year follow-up study

Mrs. Minakshi Nayak¹, Dr. Megan Teychenne^{1,2}, Dr. Karen Wills¹, Associate Professor Verity Cleland^{1,2}

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Special Interest Group: I. Socio-economic inequalities (SIG)

Background: Television (TV) time is associated with health issues such as obesity and cardiometabolic disease, especially in women, but there is a lack of prospective studies on multiple determinants of TV time. Higher TV viewing is linked with low socioeconomic position but the role of education in moderating associations between determinants and TV viewing is unknown. Therefore, among women living in socioeconomically disadvantaged neighbourhoods and using a social-ecological framework, this study aimed to 1) investigate baseline intrapersonal, social, and physical environmental factors associated with TV viewing over five years, and 2) examine whether any associations between intrapersonal, social, and physical environmental factors and TV time is moderated by education.

Methods: Data were collected three times over five years from women living in socioeconomically disadvantaged neighbourhoods of Victoria, Australia. Women self-reported weekly TV time using reliable measures. Exposure variables were intrapersonal (self-efficacy, enjoyment, outcome expectancies, behavioural skills for physical activity [PA]), social (childcare, dog ownership, sports/recreational club membership, interpersonal trust) and physical environmental (neighbourhood aesthetics, neighbourhood safety, neighbourhood walking environment, neighbourhood cohesion, number of TVs at home) factors. Multilevel-mixed modelling (negative binomial) determined baseline correlates and predictors of TV time, adjusting for covariates. Three-way interactions examined the moderating effect of education.

Results: Cross-sectionally at baseline, those reporting medium or high PA self-efficacy, PA enjoyment, outcome expectancies, behavioural skills and interpersonal trust watched less TV time. Similarly, those from neighbourhoods with medium aesthetics reported less TV time. Those with ≥ 2 TVs at home watched more TV. No longitudinal predictors of TV time were found. Education did not moderate the association between intrapersonal, social, and physical environmental factors and TV time.

Conclusions: Among women from disadvantaged neighbourhoods, cross-sectional intrapersonal, social, and physical environmental correlates of TV viewing time were identified supporting previous research, but no longitudinal predictors of TV time over five years were found. The relationship between social-ecological factors and TV time was not moderated by education status. Reasons for the lack of longitudinal associations require further in-depth investigation but could focus on exploring other TV behaviour-specific socioecological factors, and other potential individual-level socioeconomic moderators (e.g., employment status) of TV time.

Sociodemographic factors associated with adult-child nature visits

Miss Juuli-Mari Kokkonen¹, Miss Jasmine Gustafsson¹, Miss Hanna Paasio¹, Dr. Annika Wiklund-Engblom², Ms. Nea Törnwall², Associate Professor Maijaliisa Erkkola³, Associate Professor Eva Roos^{1,3,4,5}, Dr. Carola Ray^{1,3}

¹Folkhälsan Research Center, Helsinki, Finland, ²Folkhälsans Förbund, Helsinki/Vaasa, Finland, ³Department of Food and Nutrition, Helsinki, Finland, ⁴Department of Food Studies, Uppsala, Sweden, ⁵Department of Public Health, Helsinki, Finland

Special Interest Group: I. Socio-economic inequalities (SIG)

Purpose: Green exercise is associated with numerous health benefits among children. The adults in the same household have an impact on children's green exercise as adult's nature visit frequency is associated with children's nature visit frequency. Sociodemographic factors may act as predictors of family's green exercise participation. Therefore, the aim of this study is to explore the associations of sociodemographic factors and adult-child nature visits.

Methods: This study included data from three questionnaires: the cross-sectional DAGIS study collected in 2015–2016 (n=864), the DAGIS intervention study collected in 2017–2018 (n=728) and the Naturkraft (Empowered by Nature) survey collected in 2019 (n=1463). The data from the DAGIS studies were combined in the analyses. Parents of children aged 2 to 7 were the respondents of the questionnaires. The variable "adult-child nature visit frequency" was dichotomized into 1) at least once a week and 2) less than once a week. Binary logistic regression analyses were conducted and adjusted for the origin of the data and questionnaire's filler (mother/father) except for the Naturkraft-data.

Results: Adult-child nature visits decreased as the child grew older. This was observed both in the whole data sample (OR= 0.91, 95 % CI 0.86–0.97), as well as in the Naturkraft-data sample alone (OR= 0.91, 95 % CI 0.84–0.99). In the Naturkraft-data the number of children aged 7 to 17 also decreased the odds (OR= 0.84, 95 % CI 0.72–0.95) while high perceived financial situation (OR= 1.93, 95 % CI 1.35–2.75) and lower educational level of mothers (OR= 1.47, 95 % CI 1.06–2.03) increased the odds of weekly nature visits. In the combined DAGIS-data mothers outside working life increased the odds of adult-child nature visits (OR= 1.42, 95 % CI 1.02–2.00).

Conclusions: Children's age, number of children, perceived financial situation, mother's education and employment status were associated with adult-child nature visit frequency. The results partly corroborate previous studies. These results indicate that sociodemographic factors should be taken into consideration when planning activities to promote green exercise.

Socioeconomic Inequalities in Physical Activity and Sedentary Behaviour in Chile: A Systematic Review of Observational Studies

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Special Interest Group: I. Socio-economic inequalities (SIG)

Purpose: Understanding the socioeconomic inequalities in physical (in)activity and sedentary behaviours is essential to address the socioeconomic gradient in obesity. The prevalence of obesity in Chile is high and associated with socioeconomic position (SEP). Therefore, we systematically reviewed, for the first time, SEP inequalities in physical activity (PA) and sedentary behaviour (SB) in Chile.

Methods: Peer-reviewed and grey literature were searched until 31st December 2019 in PubMed, Scopus, PsycINFO, Web of Sciences and LILACS. Observational studies included were in English and Spanish, and reported comparisons of physical activity or sedentary behaviour between at least two SEP groups in Chile. Two independent researchers conducted data searches, screening, extraction, and quality assessment using the Newcastle Ottawa Quality Assessment Scale.

Results/findings: Seventeen articles (from 16 separate study samples) met the inclusion criteria (14 cross-sectional; 2 cohort). Across them, quality was considered low, medium and high for 19, 69 and 13% respectively. There was consistent evidence for a lower leisure-time physical activity and sitting time, and higher physical inactivity among adults from the lower SEP groups. Associations between SEP and total PA, moderate-and-vigorous PA, low PA, and transport and work-related PA were inconsistent.

Conclusions: Lower SEP groups in Chile spent less time in leisure-time physical activities and are more likely to be physically inactive when compared to their higher SEP counterparts. These findings are in line with previous US and European studies. Further policies should aim at understanding and tackling the unequal distribution of factors affecting leisure-time PA and physical inactivity in lower SEP groups.

Social-ecological predictors of television viewing time in women from socio-economically disadvantaged neighbourhoods: A five-year follow-up study

Mrs. Minakshi Nayak¹, Dr. Megan Teychenne^{1,2}, Dr. Karen Wills¹, Associate Professor Verity Cleland^{1,2}

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Conclusions: Children's age, number of children, perceived financial situation, mother's education and employment status were associated with adult-child nature visit frequency. The results partly corroborate previous studies. These results indicate that sociodemographic factors should be taken into consideration when planning activities to promote green exercise.

Sport participation and academic performance in children and adolescents: A systematic review and meta-analysis

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Special Interest Group: F. Early care and education (SIG)

Physical activity can improve academic performance; however, much less is known about the specific association between sport participation and academic performance and this evidence has not been synthesised. Our aim was to systematically review and combine via meta-analyses evidence of the association between sport participation and academic performance in children and adolescents. We conducted searches of five electronic databases using sport and academic performance related terms. We combined evidence from eligible studies using a structural equation modelling approach to multilevel meta-analysis. From 115 eligible studies, most of which had a high risk of bias ($k=87$), we meta-analysed 298 effect sizes. Overall, sport participation had a small positive effect on academic performance ($d=0.26$, 95% CIs 0.09, 0.42). Moderator analyses indicated that sport participation was most beneficial for academic performance when it was at a moderate dose (i.e., 1–2 hours per week), compared to no sport or a high dose of sport (3+ hours per week). Sport participation during school hours was more beneficial for academic performance compared to sport participation outside of school hours. Based on mostly low-quality studies, we found some evidence that sport could positively impact academic performance in children and adolescents. It appears that sport participation of a moderate dose and at school could be used to promote academic performance. However, if this field were to inform policy, high-quality studies are needed that provide insight into the effect of dose and sport characteristics on academic performance.

Systematic review of distribution and collection of accelerometry devices via the mail: Best practice recommendations

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Special Interest Group: J. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

Purpose: Numerous studies use mail methods to distribute and collect accelerometer devices to and from participants. In 2020 and the foreseeable future, there is a need for studies to pivot from in-person to non-contact protocols to distribute accelerometer devices via the mail. The purpose of this study is to overview mail methods for accelerometer-based data collection, highlight successful practices, offer guidance on data analysis, and provide best practices for managing mail methods protocols.

Methods: Studies, including research articles and protocol documents, describing mail-methods for distribution and/or return of accelerometers were systematically identified across 4 databases. Information regarding distribution of monitors and accompanying materials, frequency and type of contact with study participants, and rates of device loss were extracted. Studies that provided information about unique features of data processing, including determining “mail time” versus “wear time”, were also reviewed.

Results: A total of 10 articles in adult populations (average N= 8, 961, range 580 to 19,458) provided detailed information about mailing protocols (n=7) and/or data management protocols (n=3). Most of the studies that used mail protocols included (1) information for participants sent with the monitor(s), (2) frequent follow-up using phone, text, or email, (3) participant logs, and (4) trackable packages from the carrier. Challenges reported included battery life issues related to participants not wearing the device at the desired time, incomplete logs, and non-response for return after initial contact. Common data management protocols included using participant logs to determine “wear” days from “mail” days as well as visual inspection of the data. The average rate of data loss due to non-return of equipment was ~5% (range 2-10%).

Conclusions: Based on the literature and experience during the pandemic, mailing accelerometers to participants is feasible and suitable, regardless of study size. Best practices include providing detailed information about wearing a monitor, logs/diaries to document wear, and frequent follow-up with participants to ensure appropriate wear and timely return of the devices. Data processing can be carried out using standard protocols, provided researchers screen for “wear” days using participant logs and visual inspection of the data prior to processing.

Systematic review of the correlates of outdoor play and time among children aged 3-12 years

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Special Interest Group: G. Children and families (SIG)

Purpose: Due to the myriad of benefits of children's outdoor play and time, there is increasing concern over its decline. This systematic review synthesized evidence on the correlates of outdoor play and outdoor time among children aged 3-12 years.

Methods: A total of 12 electronic databases in five different languages (Chinese, English, Korean, Spanish, Portuguese) were searched between October 28, 2019 and July 27, 2020. Covidence software was used during screening and Microsoft Excel with a predesigned coding form was used during data extraction. Evidence was synthesized and correlates were categorized using the socioecological model framework.

Results/findings: Based on 107 studies representing 188,498 participants and 422 childcare centers from 29 countries, 85 studies examined potential correlates of outdoor play while 23 studies examined that of outdoor time (one examined both). The duration of outdoor play and outdoor time ranged between 60-165 min/d and 42-240 min/d, respectively. Out of 287 (outdoor play) and 61 (outdoor time) potential correlates examined, 111 correlates for outdoor play and 34 correlates for outdoor time were identified as significant correlates. Thirty-three variables were identified as key/common correlates of outdoor play/time, including eight correlates at the individual level (e.g., sex/gender, race/ethnicity, physical activity), 10 correlates at the parental level (e.g., parental attitude/support/behavior, parenting practice), nine at the microsystem level (e.g., proximal home/social environment such as residence type, peer influence), three at the macrosystem/community level (e.g., availability of space children can play), and three at the physical ecology/pressure for macrosystem change level (e.g., seasonality, rurality). No key correlates were found at the institutional level.

Conclusions: Individual, parental, and proximal physical (home) and social environments appear to play a role in children's outdoor play and time. Ecological factors (i.e., season, rural) also appear to be related to outdoor play/time. Standardizing terminology and measures of outdoor play/time is warranted. Future work should investigate the interactions and processes of multiple variables and levels of socioecological modelling to better understand the mechanisms through which outdoor play/time opportunities can be optimized for children.

Taste, price, and availability of healthy foods are important purchasing factors for university students and should be considered when impacting their purchasing behaviours

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Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: Tertiary education setting-based nutrition labelling studies show that point-of-purchase (POP) nutrition labelling interventions are well accepted but not significantly influential on diet choices. Health and nutrition are ranked low as a purchasing factor by university student (18-35 years) consumers in this setting. This presentation aims to show how the addition of nutrition education and positive marketing to POP nutrition labelling interventions can show a greater impact. However, several other purchasing factors need to be addressed to improve the food selection of university students.

Methods: Three nutrition labelling intervention studies: (1) kilojoule labelling alone (2) kilojoule labels with marketing ("8700 kJ campaign") and (3) tick symbols ✓ were placed next to the targeted healthier items. Food sales of labelled items were tracked before, during each intervention, and eight weeks after. A sub-sample of university students (n = 872; aged 18-35 years) was surveyed during the interventions to assess, purchasing factors, awareness, influence, sentiment and anticipated future impact of food labelling and positive marketing campaigns.

Results: Only 30 % university students were initially aware of the kJ labels on the menu without the marketing campaign. Seventy-five percent of students were accepting of kJ labelling with the marketing campaign. Respondents viewing the marketing campaign and then using kJ values on the menu selected meals with lower mean energy content, constituting a reduction of 978 kJ ($p < 0.01$). Sixty-eight percent of respondents noticed the tick symbols on targeted healthier items, and of that, 30 % reported being influenced. Taste was the most common purchasing factor, and people were less likely to select taste as a factor if they were influenced by nutrition labelling ($P = 0.04$).

Conclusions: Identifying healthier options with labelling at the POP increased sales over time. Increasing awareness and providing education about energy requirements and healthier options through a marketing campaign resulted in greater attention to, and use of, the labels to purchase lower energy menu choices. However, several purchasing factors (price, taste, and healthy food availability) need to be addressed to improve university students' food selection.

Test-retest reliability and internal consistency of items assessing movement behaviour compensation in primary school children

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Special Interest Group: G. Children and families (SIG)

Purpose: There is considerable debate about the possibility of movement behaviour compensation. Little research has examined children's perceptions as to whether or how compensation may occur, and few tools exist to assess this. A 17-item survey was developed to test children's perceptions of compensatory changes occurring across 15 groupings by domain (e.g. cognitive/psychological, behavioural, and physiological compensation) and timeframe (e.g. within-day, between-day compensation). The aim of this study was to determine the test-retest reliability and internal consistency of this survey assessing children's perceptions of compensation.

Methods: Sixty-three children (Grades 4-6) from three Australian primary schools, completed a survey at school at two time-points (T1 and T2), at least one week apart. An example question is 'When I do lots of activity at school... I am (not) very tired the next day.' Children select which response is most like them on a 4-point Likert type scale. Due to COVID-19, T2 data collection was completed in two schools. Internal consistency was assessed using Cronbach's Alpha at both T1 and T2 for all survey items, as well as within groupings. Intraclass Correlation Coefficients (ICCs) assessed absolute agreement across all survey items, as well as within groupings.

Results: All children completed the survey at T1, and 18 children completed T1/T2 surveys. Cronbach's alpha was considered acceptable ($\alpha \geq .60$) across 12/15 groupings (except PA in behavioural domain, and PA/SED in cognitive and physiological domains) at T1, and 14/15 groupings at T2 (except PA in behavioural domain). Intra-class correlations for all survey items (i.e. summed compensation score of 17 items) were moderate ($ICC=0.58$), and at least moderate-good for 11/15 groupings assessed (except PA/SED in cognitive and behavioural domains, and within-day compensation).

Conclusions: This survey had acceptable reliability and internal consistency for all 17 survey items (summed compensation score) and for most survey items groupings (PA in physiological domain, PA/SED in behavioural domain, SED within-day, PA/SED between-day, and general PA/SED compensation). Future studies could compare children's perceptions of compensation to device-based assessments of movement behaviours. Understanding compensatory perceptions within different domains could help guide the development of physical activity interventions in the future.

Texting to ComeBACK: Acceptability and dosage of a text message intervention to improve physical activity in adults with difficulty walking

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Special Interest Group: D. e- & mHealth (SIG)

Purpose: The Coaching and Exercise for Better Walking (ComeBACK) trial is a hybrid effectiveness-implementation (type 1) three-arm pragmatic randomised controlled trial (n=600). It is investigating the effectiveness of two interventions (a physiotherapy-led telephone health coaching intervention and a prescheduled unilateral text message intervention) compared to a waitlist control group to enhance physical activity in adults living in the community with self-reported walking difficulties. The main aim of this study is to report on the dosage of text messages received in the Texting to ComeBACK and Texting to ComeBACK Later groups, as well as report on the participant acceptability of the intervention.

Methods: Data on the dosage of text messages received by participants in the ComeBACK program is retrieved from the web-based SMS delivery service and reported descriptively. The acceptability of the texting intervention is being assessed through a study-specific questionnaire completed at the end of the intervention period and reported descriptively.

Results: To date, there have been 240 participants randomised in the ComeBACK trial, 161 of these into the Texting to ComeBACK and Texting to ComeBACK Later groups. Of the participants currently receiving text messages or who have completed the program, 72% have maintained the frequency of text messages at 5 times a week, 18% have reduced to 3 times a week and 7% have increased to daily messages. 11% of participants have, at some stage, paused the sequence primarily due to illness. A small number of participants (4%) have requested to opt out of the messages. Of the 75 participants who have completed the texting interventions, the average rating of benefit of the program was 6/10. Fifty-two percent of participants (52%) reported the program met their expectations and 57% would recommend it to others.

Conclusions: A web-based SMS service can be set up to deliver physical activity health coaching text messages as intended. Text message interventions may be an acceptable intervention to enhance physical activity for adults living in the community with a walking difficulty.

The acceptability, feasibility, and effectiveness of wearable activity trackers for increasing physical activity in children and adolescents: A systematic review

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Special Interest Group: G. Children and families (SIG)

Wearable activity trackers (wearables) may offer an affordable and accessible way of increasing child and adolescent physical activity (PA). Wearables have been shown to successfully increase adult PA, however, less is known about their impact on child and adolescent PA. The aim of this systematic review was to examine the acceptability, feasibility and effectiveness of wearables, and their potential mechanisms of action, for increasing PA, in 5- to 19-year olds. A systematic search was conducted of 7 databases (start date of each database to December 2019). The following eligibility criteria were used: (a) published in English; (b) participants aged 5- to 19-years; (c) examined the use of a wearable within an intervention, acceptability or feasibility study; and (d) measured PA and/or experiences of using a wearable. The presence or absence of behaviour change techniques (BCTs), were coded, using the behaviour change technique taxonomy v1. A narrative review (effectiveness findings), and thematic synthesis (acceptability and feasibility findings) were conducted. Study heterogeneity did not permit a meta-analysis. Thirty-three studies were included. There was some evidence that wearables increase steps, and moderate-to-vigorous-intensity PA and reduce sedentary behaviour. Some evidence suggested that multi-component interventions may be more effective than using a wearable alone. On average, 7.8 BCTs (range:2-12) were present in studies exploring the effectiveness of wearables. From the thematic synthesis, four analytical themes (14 subthemes) were identified: (1) perceived facilitators and barriers of using a wearable may impact device use, (2) affective attitude: feelings towards using wearables, (3) wearables ease of use, understanding of PA outputs, and perceived impact on PA varies between devices and individuals, and (4) perceived mechanisms of action underlying wearables impact on PA. Children and adolescents reported wearables increased their PA, via wearable features that promote self-monitoring, goal setting, feedback, and competition. However, barriers of wearable use (technical difficulties, novelty effect) were present. Thus, there is some evidence that wearables are an acceptable, feasible and effective way of increasing PA, in 5- to 19-year olds. Future interventions may benefit from incorporating multiple intervention components and more BCTs, and aiming to overcome barriers of wearable use.

The Acute Effects of Continuous and Intermittent Running on Executive Function in Children: The Daily Mile™ vs Shuttle Runs

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Special Interest Group: G. Children and families (SIG)

This study investigated the effect of acute continuous and intermittent physical activity (PA) on children's executive function (EF). Twenty-nine participants (16 boys $M=9.34 \pm 0.48$ years), using a within-subjects design, performed a continuous (The Daily Mile™) and an intermittent PA running bout (Shuttle Runs: $\geq 85\%HR_{max}$; 12 bouts 30 active/45s rest), both lasting 15min. The Stroop task, Digit Span and Corsi Blocks tests were administered before, 1 min post and 30 min post. Comparing both conditions (Repeated Measures ANOVA), The Daily Mile™ (TDM) group has not significantly changed compared to the control condition (all $p>0.05$). Whereas the Shuttle Runs condition improved for 1 min post (congruent stimuli) (mean diff= $119ms \pm 37$; $p=0.004$, respectively) compared to control. No effects on visual or verbal memory were observed (all $p>0.05$). The results demonstrated that an intermittent PA bout might be a time-efficient approach for enhancing EF, with the shuttle runs condition having a better inhibitory performance following PA, suggesting that this protocol might be more appropriate for implementation in school settings than the TDM to promote improvements in EF.

Keywords: Physical Activity, Cognitive Performance, Inhibition, Working Memory

The association between chronic stress and visceral obesity over 7 years in the general population: The Hoorn Studies

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Special Interest Group: L. Other

Purpose: One of the underlying reasons for the rise in (visceral) obesity is thought to be stress. Previous studies have found that both chronic and acute stress were weakly associated with weight gain. This weak association might be explained by a variance in behavioral and psychological responses that individuals express when exposed to stress. Therefore, the potential moderating factors in the complex association between stress and adiposity need to be explored further. We aimed to assess associations between chronic stress and visceral obesity over a seven-year period in the general population and assess moderation by weight change.

Methods: Two population-based cohorts were combined: the Hoorn Study (1989-1998) and the New Hoorn Study (2006-2015), with a total of 2535 participants. Stressful life events were self-reported and total baseline and follow-up scores were summed to create a ten-year stressful life event score which were grouped in quartiles. BMI (kg/m²) and waist circumference (cm) were measured at baseline and follow-up. Linear regression analyses were performed to assess associations between stressful life events and BMI/waist circumference for both the total sample and the stratified sample based on three weight-change groups, “gained weight” (≥ 2 kg), “lost weight” (≤ 2 kg), and “maintained weight” (weight change less than 2 kg). Analyses were adjusted for age, sex, education, follow-up duration, baseline weight status, smoking, physical activity, and comorbidities.

Results: In the fully adjusted models, stressful life events were associated with an increase of waist circumference for the highest versus the lowest quartile (0.98 (95%CI: 0.2;1.8)), but not with change in BMI (0.13 (95%CI: -0.1;0.4)). The moderation analyses showed that in those who gained weight, a higher stress quartile had a significant increase in waist circumference (1.60 (95% CI: 0.5;2.7)) as well as an increase in BMI (0.33 (95%CI: 0.04;0.6)), compared to the participants in the lowest stressful life event quartile. No associations were found for the groups who lost or maintained weight with BMI or waist circumference.

Conclusions: Chronic stress amplifies changes in (visceral) obesity among those who gained weight over time, but not among those who lost weight in the general population.

The association between maternal feeding practices and toddlers' fruit and vegetable intakes: a follow up to the DIT-Coombe Hospital birth cohort in Ireland

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Special Interest Group: G. Children and families (SIG)

Purpose: Mothers play a crucial role in shaping children's early experiences with foods. This study was conducted to explore the association between maternal feeding practices and toddlers' fruit and vegetable intakes in Ireland. Relevant studies have focused on pre-school and school-age children. This study was novel in investigating into toddlerhood, the critical period for the development of eating habits.

Methods: The DIT-Coombe Hospital birth cohort was conducted in Dublin to assess maternal breastfeeding and weaning practices from birth to six months of infants' life. The present study was a follow up study two years upon the completion of the cohort. Mothers in the cohort were contacted via telephone and invited to participate in the present study. A questionnaire assessing maternal feeding behaviour and the child's 3-day food diary were sent to mothers who agreed to take part in the present study by mail, together with a self-addressed stamped envelope. Logistic regression analyses were performed to examine the association between maternal infant and toddler feeding practices and toddlers' fruit and vegetable consumption, after controlling for potential confounders.

Results: There were 193 mother-children pairs included in this study, including 106 (54.9%) boys and 87 (45.1%) girls. The mean age of children was 2.4 ± 0.7 years. Toddlers' mean daily intake of vegetable was 149.6 ± 73.7 g, and the median daily intake of fruit was 169 (IQR: 101, 289) g. The contribution of fruit and vegetable to total dietary intake was 24.3%. Maternal practices of letting the child eat with other family members (OR=3.894, 95% CI: 1.155-13.127) and not being too worried about child's food refusal (OR=2.858, 95% CI=1.295-6.307) were positively associated with toddlers' vegetable intake. Breastfeeding for more than four weeks (OR=2.508, 95% CI: 1.167-5.394) and the use of coaxing strategy (OR=2.234, 95%CI=1.024-4.912) was positively associated with toddlers' fruit intake.

Conclusions: To promote toddler's fruit and vegetable intake, and develop good eating habits, mothers should eat with their children, be patient and not put much pressure on their children when feeding.

The association between nature-based early childhood education and children's physical activity levels and motor competence: a mixed-methods systematic review

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Special Interest Group: F. Early care and education (SIG)

Purpose: Early intervention is required to increase physical activity (PA) levels and motor competence (MC) in pre-school children. Nature-based early childhood education (ECE) may enhance children's PA and MC. The purpose of this study was to systematically review and synthesise global evidence on associations between nature-based ECE and children's PA and MC.

Methods: A literature search including nine databases and grey literature was concluded in August 2020 to capture published and unpublished evidence. Studies were eligible if a) children were aged 2-7 years old and attending centre-based ECE, b) ECE settings integrated nature, and c) they assessed physical outcomes at a child level. Two reviewers independently screened full-text articles and assessed study quality. Data extraction was completed by one reviewer and checked by another. Synthesis was conducted using effect direction (quantitative) and thematic analysis (qualitative), and the certainty of evidence was assessed using GRADE.

Results: After duplicate removal, 31,098 records remained, of which 1,370 full-text articles were screened and 33 unique (25 quantitative; 8 qualitative) studies were eligible. Of the quantitative studies, 20 studies assessed PA, (4,961 children) and 6 assessed MC (523 children). Studies were of controlled (n=5) and uncontrolled (n=2) before/after design, and cross-sectional design (n=18). Findings indicated inconsistent associations between nature-based ECE and children's sedentary time, moderate-to-vigorous physical activity (MVPA) and object control skills (n=2 studies each). A positive association was found for balance whereas there was a negative association on speed and agility (n=3 studies each). Positive associations were also found between specific natural elements (e.g. vegetation) and lower sedentary time (n=3), and higher MVPA (n=6) and total PA (n=4). The quality of 23/25 studies was weak. From the qualitative analysis (248 children), most studies indicated that nature-based ECE affords higher intensity PA and risky play, however, some also suggested that PA and risk were similar irrespective of playground type.

Conclusions: Nature-based ECE may benefit some PA and MC outcomes but drawing firm conclusions is difficult because the evidence is limited. More high-quality studies are needed to understand the impact of nature-based ECE on children's PA levels and MC.

The association of energy and macronutrient intake with all-cause mortality, cardiovascular disease and dementia: findings from 120,963 women and men in the UK Biobank

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Special Interest Group: K. Disease prevention and management

Purpose: Dietary guidelines generally reference the effect of individual macronutrients. However, macronutrients are not eaten in isolation and therefore the relevance of such an approach needs to be assessed, particularly regarding disease risk.

Methods: A prospective cohort of 120,963 individuals (57% women) from the UK Biobank, who completed \geq two 24-hour diet recalls were included. The associations of energy intake and macronutrients (carbohydrate (total, sugar and fibre), protein (total) and fat (total, saturated and unsaturated)), as percentages of total energy intake, with death, cardiovascular disease (CVD) and dementia were investigated. Combinations of macronutrients were defined using k-means cluster analysis, and macronutrient combinations explored in association with outcomes. Cox proportional hazard models were used to estimate hazard ratios (HRs) and 95% confidence intervals (CIs) for death and competing risk analyses, producing sub-distribution HRs (SHRs), were conducted for CVD and dementia. Sex differences were investigated.

Results: There was a higher risk of death with high carbohydrate intake (upper versus lowest third HR 1.12, (95% CI, 1.02, 1.22)), yet a lower risk with higher intakes of protein (upper versus lowest third 0.83, (0.77, 0.90)). There was a lower risk of CVD with moderate intakes (middle versus lowest third) of energy and protein (SHR 0.87 (0.78, 0.96) and (0.87 (0.79, 0.96)) respectively). There was a lower risk of dementia with moderate energy intake (SHR 0.70, (0.52, 0.96)). Minimal sex differences were identified. The dietary cluster characterised by low carbohydrate, low fat and high protein was associated with a lower risk of death (HR 0.86, (0.78, 0.95) compared to the reference cluster (characterised by low polyunsaturated fat and low protein intake), and was associated with a lower risk of CVD for men (SHR 0.84 (0.72, 0.98)).

Conclusions: We found some evidence that energy, protein and carbohydrate intake were each associated with risks of death, CVD or dementia. However, combining nutrients may lead to more meaningful epidemiological analyses. We identified one dietary cluster, characterised by low carbohydrate, low fat and high protein intake which reduced the chance of premature death, and CVD for men. This suggests dietary guidelines and interventions could target this grouping to improve health outcomes.

The changing nature of sedentary behaviour: Global trends in screen-based behaviours from 2012-2019

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Special Interest Group: J. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

Purpose: Across numerous contexts, many adults accumulate considerable time in screen-based behaviours, which has been associated with negative physical and psychological health outcomes. Currently, there is a lack of evidence on patterns of contemporary screen-based behaviours and trends in usage over time. Using up-to-date industry data, the purpose of this research was to characterise contemporary patterns of screen-based behaviours and describe temporal trends in these behaviours by global region, age, sex and education.

Methods: Data were from GWI (previously known as Global Web Index), a digital technology market research company, and were collected annually between 2012 and 2019. Temporal trends in PC, laptop and tablet use, mobile phone use, traditional TV viewing, online TV viewing and games console use were described using data from over 2 million participants from 46 countries. Total screen time was calculated as the sum of all behaviours listed above. Means and standard deviations (SD) were calculated for each time point for the full sample and stratified by global region, age, sex and education.

Results/findings: Globally, daily mean duration of screen time increased from approximately 9 hours in 2012 to 11 hours in 2019. Latin America exhibited the largest increase in screen-time during this period (2012 (mean(SD): 10:38(10:55); 2019: 13:43(12:59)). Globally, between 2012 and 2019, time spent watching traditional TV decreased by approximately 15 minutes whilst the duration of time spent on a mobile phone increased by approximately 2 hours. The results also demonstrated that duration of time spent on different types of screens varied by socio-demographic factors. Daily mean duration of time spent on a mobile phone demonstrated noticeable differences between age groups with usage being much higher in younger age groups.

Conclusions: The findings indicate that screen-based behaviours such as mobile phones and online TV have become more prevalent over the last 8 years. However, these behaviours are rarely included in public health surveillance and little is known about their links to physical and mental health. Surveillance and research tools should be reviewed and updated to include contemporary types of screen-based behaviours.

The development of a wear-site detection algorithm of accelerometer data by applying machine learning techniques

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Special Interest Group: J. Assessment and Methodologies in Behavioral Nutrition and Physical Activity

Purpose: Many research studies have adopted accelerometry as a measure for movement behaviors. Traditionally, the site in which the devices are attached to the body must be determined prior to deployment as it affects the choice of data extraction method and cut points, and it cannot be determined retrospectively. The ability to detect the device wear-site after collection could allow greater flexibility for deployment and less reliance on adhering instructed protocols. Thus, in this study, we developed and examined the efficiency of a machine learning-driven wear-site detection algorithm based on raw accelerometer data.

Methods: 60 participants (30 adults, 18-65 years; 30 youths, 9-17 years) wore tri-axial ActiGraph accelerometers at three sites (waist, wrist, and chest) and conducted a series of lab-based physical activities. Raw accelerations, at 100Hz, of activity segments were extracted and used for analyses. The Long Short-Term Memory approach was used for the development of the classification algorithm. 80% of the data was used for model training and the remaining 20% was used for validation.

Results/findings: Models for classification between three (waist, wrist, and chest) and two (waist and wrist only) were developed and evaluated separately. Both models resulted in high accuracies in wear-site detection: 0.94 and 0.98 for three and two wear-sites, respectively. The performances of the algorithm were similar for adults and youths.

Conclusions: The developed algorithm demonstrated promising accuracies in terms of detecting the wear-site of accelerometers. This implies that researchers can determine wear sites retrospectively and then apply appropriate cut-points for activity classification. Furthermore, wear-site neutral algorithms can be developed, which would allow researchers to measure movement behaviors of participants more accurately.

The effect of a peer-delivered healthy lifestyle intervention in secondary vocational education on dietary and physical activity behaviours: results of a repeated cross-sectional study

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Special Interest Group: H. Policies and environments (SIG)

Background: Unhealthy lifestyle choices are a major problem in secondary vocational students. However, very few healthy lifestyle interventions have been developed to improve their health behaviours. This study examines the effectiveness of the peer-delivered, school-based intervention Healthy by Design (HbD). The main aim of the HbD intervention is to promote a positive change in the (determinants of) dietary and physical activity behaviours among secondary vocational students.

Methods: The HbD intervention was implemented at two locations of a secondary vocational school in a metropolitan area of the Netherlands. In the intervention implementation phase, senior secondary vocational students functioned as role-models to motivate fellow-students to eat healthy and be physically active. Data were collected in two cross-sectional surveys before and after intervention implementation. In total 1,177 vocational students (before: 557, after: 620) participated in an online health behaviour survey. Multilevel logistic and multilevel linear models explored the effect of the intervention over time and the effect of the intervention dose received on (determinants of) dietary and physical activity behaviours. Intervention dose received was calculated using various survey questions asking about exposure to the intervention.

Results: A significant positive effect over time was found for moderate intensity physical activity and knowledge of the under 18 physical activity guidelines. A high intervention dose was positively associated with increased water, breakfast and fruit consumption and higher levels of moderate and vigorous physical activity compared to no intervention dose received. A moderate and high intervention dose was negatively associated with high calorie snacks consumption compared to no intervention dose received.

Conclusions: Effects of the HbD intervention on the investigated dietary and physical activity behaviours over time are limited and restricted to a positive change in (determinants of) physical activity behaviour. However, a higher intervention dose showed a strong relation with healthier dietary and physical activity behaviours. This suggests that low exposure to an intervention is not enough to promote behaviour change. Therefore, it is important to make sure that students come into contact with intervention components on a regular basis.

The effect of ambulatory hospital initiated behaviour change interventions on changes in physical activity and anthropometrics: a systematic review and meta-analysis

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Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: The aim of this systematic review and meta-analysis was to investigate the effectiveness of behaviour change interventions for changes in physical activity and anthropometrics (body mass, body mass index and waist circumference) in ambulatory hospital populations.

Methods: A systematic literature search was conducted using five bibliographic databases (MEDLINE, Embase, CINAHL, The Cochrane Central Register of Controlled Trials (CENTRAL) and PsycINFO) to identify randomised controlled trials of ambulatory hospital initiated behaviour change interventions. Two review authors independently screened studies for eligibility, completed data extraction and assessed the risk of bias and complexity of each of the included studies. Meta-analyses were conducted using change scores from baseline to determine mean differences (MD), standardised mean differences (SMD) and 95% confidence intervals (95% CI). The quality of evidence was evaluated using the Grades of Recommendation, Assessment, Development and Evaluation approach.

Results: Twenty nine studies met the eligibility criteria, and 21 studies were included in meta-analyses. Ambulatory hospital initiated behaviour change interventions significantly increased physical activity (SMD: 1.30; 95% CI: 0.53 to 2.07, $p < 0.01$), and resulted in significant reductions in body mass (MD: -2.74; 95% CI: - 4.42 to - 1.07, $p < 0.01$), body mass index (MD: -0.99; 95% CI: - 1.48 to - 0.50, $p < 0.01$) and waist circumference (MD: -2.21; 95% CI: - 4.01 to - 0.42, $p = 0.02$). Due to the heterogeneity in study populations, reported outcomes, and intervention components, the GRADE assessment indicated that the evidence is very uncertain about the effect of behaviour change interventions on changes in physical activity and anthropometrics in ambulatory hospital patients.

Conclusions: Behaviour change interventions initiated in the ambulatory hospital setting resulted in a significant increase in physical activity and significantly reduced body mass, body mass index and waist circumference. The results support the implementation of behaviour change interventions in ambulatory secondary care clinics for the mitigation of chronic disease risk factors. The explicit reporting of behaviour change interventions definitions, theories and techniques in published studies is strongly recommended.

The Effect of an Acute Sedentary Behaviour Reducing Intervention on Subjective Well-Being among University Students: A Pilot Randomized Trial

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Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: The relationship between sedentary behaviour (SB) and subjective well-being (SWB) is currently unclear. Numerous cross-sectional studies demonstrate weak, negative correlations between high SB and poorer SWB outcomes. Recent research suggests that within-person changes in SB may be more strongly associated with outcomes of SWB than between-person differences, warranting experimental exploration. However, relatively little research has explored the relationships between SB and SWB outcomes experimentally, limiting current interpretations of the nature of these relationships. Hence, the primary purpose of this pilot study was to examine the preliminary effectiveness of an acute sedentary behaviour (SB) reducing intervention to enhance university students' subjective well-being (SWB).

Methods: A three-week (i.e., baseline, intervention, follow-up) randomized controlled pilot trial was conducted. Thirty-two sedentary (i.e., ≥ 7 hours of device-measured SB) university students from the local institution were randomized to an acute behavioural counseling intervention ($n = 17$) or control group ($n = 15$). Behavioural counseling was aimed at reducing daily SB for 1 week and was grounded in the Health Action Process Approach theory. Device-measured SB outcomes (i.e., average daily steps, standing time, sitting time, and sit-to-stand transitions), self-reported SBs (i.e., self-compared, domain-specific), and SWB measures (i.e., affect, life satisfaction, subjective vitality, overall SWB) were assessed weekly. A series of repeated-measures ANOVAs were conducted for outcomes of interest.

Results/findings: Repeated-measures ANOVAs revealed non-significant medium-to-large effects for self-reported SBs (i.e., $0.116 \leq \eta^2 \leq 0.253$), device-measured standing time (i.e., $\eta^2 = 0.161$), and life satisfaction and overall SWB (i.e., $0.141 \leq \eta^2 \leq 0.178$) favouring the treatment group over the control group.

Conclusions: Overall, this acute intervention was ineffective in reducing SB among university students. Comparatively to previous acute SB-inducing interventions, results suggest that SB-reducing interventions may require more robust treatment application than the current pilot study. Strategies such as prompts/cues, repeated intervention delivery, and longer intervention periods are recommended. Strategies that promote larger non-convenient sampling (e.g., longer recruitment periods) also are recommended. Taken together, these strategies will increase treatment effects and statistical power of subsequent intervention trials.

The effectiveness of sedentary behaviour interventions on sitting time and screen time in children and adults: An umbrella review of systematic reviews

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Special Interest Group: B. Motivation and behavior change (SIG)

Background: There is increasing concern about the time people spend in sedentary behaviour, including screen time, leisure and occupational sitting. The number of both primary research studies (published trials) and reviews has been growing rapidly in this research area. A summary of the highest level of evidence that provides a broader quantitative synthesis of diverse types of interventions is needed. This research is to articulate the evidence of the efficacy of sedentary behaviour interventions to inform interventions to reduce sitting time. The umbrella review, therefore, synthesised systematic reviews that conducted meta-analyses of interventions aiming at reducing sedentary behaviour outcomes across all age group and settings.

Methods: A systematic search was conducted on six databases (MEDLINE Complete, PsycINFO, CINAHL, Global Health via EBSCOhost platform, EMBASE, and Cochrane Central Register of Systematic Reviews). Included articles were systematic reviews with meta-analysis of interventions aiming at reducing sedentary behaviour (screen time, sitting time or sedentary time) in the general population across all age group.

Results: Seventeen reviews met the inclusion criteria (7 in children and adolescent, 10 in adults). All reviews of sedentary behaviour interventions in children and adolescents investigated intervention effectiveness in reducing screen time. Six out of 11 meta-analyses (reported in 7 reviews) showed small but significant changes in viewing time. All reviews of sedentary behaviour interventions in office workplaces indicated a substantial reduction in occupational sitting time (range: 39.6 to 100 min per 8-hour workday). Sub-group analyses reported a trend favouring environmental change components such as sit-stand desks, active permissive workstations etc. Meta-analyses indicated that sedentary behaviour interventions were superior to physical activity alone interventions or combined physical activity and sedentary behaviour interventions in reducing sitting time.

Conclusions: The current systematic reviews and meta-analyses supported sedentary behaviour interventions for reducing occupational sitting time in particular, with small changes seen in screen time in children and adolescents. Future research should explore approaches to maintaining behaviour change beyond the intervention period and investigate the potential of sedentary behaviour reduction interventions in older age groups in non-occupational settings.

The Great Big Move: Evaluating the effectiveness of an in-app challenge to increase engagement with a national physical activity tracking app

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Special Interest Group: D. e- & mHealth (SIG)

Purpose: Physical activity (PA) tracking app interventions can increase PA among users although engagement remains a challenge. This study examined the effects of an in-app PA challenge intended to increase app usage and PA among users of the ParticipACTION app, a freely available and nationally promoted PA app.

Methods: From 1-31 October 2020, the Great Big Move Challenge (GBM) encouraged PA by allowing users to virtually travel across Canada and track PA minutes on the ParticipACTION app. App users participated in the challenge in teams of up to 8. Engagement metrics were extracted from internal app analytics and moderate-to-vigorous PA (MVPA) data were extracted from the app database, using an 8-week (21 September-14 November 2020) quasi-experimental design assessing MVPA two weeks before and after the 4-week challenge. Weekly MVPA was monitored through wearable fitness trackers and health apps synced to the ParticipACTION app. Repeated measures ANOVAs with simple main effects were used to determine changes over time (pre/post; mean+SE) and differences between groups (Participants/Non-participants).

Results: The GBM attracted 30,932 new registered users to the ParticipACTION app and increased monthly active users by 185% from 20,434 users in September to 58,134 in October. A total of 6,414 users had data for all 8 weeks of the evaluation, 3,025 participants (app users on a team) and 3,389 non-participants (app users not on a team). Non-participants (214.5±5.0 min) recorded less MVPA at Week 1 compared to participants (248.5±5.3 min, $p<0.001$). Non-participants steadily declined in MVPA over the 8 weeks (Week 1: 214.5±5.0 min vs Week 8: 158.2±4.1 min, $p<0.001$), while participants demonstrated an increase in MVPA that peaked at Week 3 and then declined (Week 1: 248.5±5.3 min, Week 3: 290.2±5.1 min, $p<0.001$; Week 6: 258.2±4.6 min, $p=0.050$; Week 8: 196.1±4.5, $p<0.001$). App usage declined after the challenge, 28,077 users had some PA data during Week 3 compared to 14,203 users by Week 8.

Conclusions: In-app challenges appear to be a viable approach to drive app engagement and increase MVPA short-term. Significant declines in MVPA occurred following the challenge which may reflect disengagement with the app. Long-term app engagement remains a challenge.

The Impact of Covid-19 on Participation in Sport and Physical Activity in Ireland. What is Sport Ireland's data telling us?

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Special Interest Group: L. Other

Aim: In the last week of February 2020, just as the first Covid-19 cases were being reported in Ireland, Sport Ireland commissioned Ipsos MRBI to undertake a survey of respondents aged 15+ with the aim of providing insights into Sports Participation and Recreational Walking trends in Ireland through the pandemic. The self reported seven day recall questions used on this survey were identical to the ones used in the Irish Sports Monitor (ISM) allowing for comparison with 2019 and now 2021 data.

Methods: The 2020 telephone survey was undertaken over 7 waves between February and September 2020 using random digit dialling. Wave 1 pre-dated most of the limitations on movement. The second wave happened mostly under the "Delay" phase of the pandemic (March). Waves 3 to 5 took place during the "Stay at Home" lockdown phase (April-May) and waves 6 and 7 were aligned with the first two phases of the Roadmap for Reopening Society and Business (May-September). Approximately 1,000 respondents took part in each wave.

Results: As the Covid-19 pandemic in Ireland progressed in 2020, physical inactivity consistently declined. At the peak of the pandemic restrictions in Ireland in May, approximately 255,000 people or 7% of the population, who were previously inactive, started walking or taking part in sport.

Personal exercise, cycling and running were the most popular sports during the reopening phase, bringing sports participation levels nearly in line with 2019 levels to 45%. A large majority of respondents identified that physical activity was more important during these times with roughly one in five adults having taking up a new activity.

However, as the pandemic has progressed, early data from ISM 2021 suggests that while recreational walking levels have held strong, participation in Sport is on a decline. This data suggests that a large take up in recreational walking among the younger cohort (16-24) has driven participation rates in walking. The challenge emerging is the potential detrimental effect on fitness and confidence levels of individuals, potentially affecting their likelihood of returning to sport in the future.

Conclusions: Two key areas for consideration have emerged- 1. sustaining the positive trends seen particularly with recreational walking and building on that to move people back into Sport 2. recovering losses incurred in facility and team based sport.

The impact of participant mental health on attendance and engagement in a trial of behavioural weight management programmes: Secondary analysis of the WRAP trial

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Special Interest Group: K. Disease prevention and management

Background: Low attendance and engagement in behavioural weight management trials are common. Research suggests that mental health may play an important role, however previous research exploring this association is limited with inconsistent findings. We aimed to investigate whether participant mental health (including anxiety, depression, quality of life, satisfaction with life) was associated with attendance and engagement in a trial of behavioural weight management programmes.

Methods: This is a secondary data analysis of the WRAP trial, which randomised 1267 adults with overweight or obesity to a brief intervention, WW (formerly Weight Watchers) for 12-weeks, or WW for 52-weeks. We used regression analyses to assess the association of baseline mental health with programme/trial attendance and engagement.

Results: Every one unit of baseline depression score was associated with a 1% relative reduction in rate of session attendance (IRR 0.99; 95% CI 0.98, 0.999; n=625). An increase in anxiety was associated with 4% reduction in odds to report high engagement with WW digital tools (OR 0.96; 95% CI 0.94, 0.99). Every one unit of global quality of life was associated with 69% lower odds of reporting high engagement with the WW mobile app (OR 0.31; 95% CI 0.15, 0.64). Increases in depression and anxiety were associated with decreased odds of attending study visits ([3-months: anxiety - OR 0.95; 95% CI 0.92, 0.98; depression - OR 0.93; 95% CI 0.89, 0.97]; [12-months: anxiety - OR 0.94; 95% CI 0.91, 0.97; depression - OR 0.94; 95% CI 0.91, 0.98]; [24-months: anxiety - OR 0.94; 95% CI 0.91, 0.97; depression - OR 0.95; 95% CI 0.91, 0.997]; [60-months: anxiety - OR 0.95; 95% CI 0.92, 0.98; depression - OR 0.94; 95% CI 0.91, 0.97]).

Conclusions: Participants are less likely to attend programme sessions, engage with resources, and attend study assessments when reporting poor baseline mental health. Differences in attendance and engagement were small, however changes may still have a meaningful effect on programme and trial effectiveness. Future research should investigate targeted strategies to maximise attendance and engagement in those reporting poorer mental health.

The impact of resistance training on strength and weight status of overweight/obese and/or inactive youth

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Special Interest Group: G. Children and families (SIG)

Purpose: Physical Activity (PA) is an integral component of prevention and treatment programmes for overweight/obese youth. While the PA guidelines recommend 'activity to develop movement skills, muscular fitness and bone strength', there has been limited research to date on health-related outcomes of resistance training (RT). The aim of this study was to explore the impact of a RT intervention on strength and weight status of overweight/obese and/or inactive youth.

Methods: Following ethics approval, 12 participants were assigned to an experimental (EG; males = 3, females = 3, age 8.7±1 years, BMI z-score = 2.54±0.61) or control group (CG; males = 4, females = 2, age 9.2±1 years, BMI z-score = 1.50±0.93). Data presented as mean±SD. Pre and post intervention assessments for strength (isometric mid-thigh pull) and weight status (stature, mass, four skinfold sites, and girth measurements) were completed and BMI z-scores calculated. The EG participated in a 10-week RT programme, with 45 min sessions 2x a week.

Results/findings: Attendance at the RT programme was 93%. There were no statistically significant differences between the EG and CG in changes in any outcomes. There was a large effect size for relative strength (Hedges' $g = 0.825$, $P = 0.140$). There was a medium positive effect on upper arm circumference (Hedges' $g = 0.500$, $P = 0.357$) with a decrease in the EG, but an increase in the CG.

Conclusions: There was high attendance at the intervention suggesting RT may be a feasible intervention for overweight/inactive youth. The increase in relative strength is key, as for an overweight population, strength level may be insufficient to perform activities of daily living due to a high body mass. The decrease in upper arm circumference could be explained by increases in overall energy expenditure from taking part in an active intervention. However, this is difficult to interpret due to no change in skinfolds, although it would be unlikely that this change would be due to a decrease in muscle mass as the intervention involved RT. While there is some evidence to support a positive effect of RT, a larger scale study of longer duration is recommended.

The Impact of Sex on Preschool-age Children Compliance with the 2018 DHHS Physical Activity Guidelines

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Special Interest Group: G. Children and families (SIG)

Purpose: Associations between low levels of physical activity (PA) and adverse health outcomes have been reported in preschool-age children (preschoolers). Utilizing previous PA guidelines, studies have shown that most children do not meet PA guidelines. Preschoolers (61%) spend a significant portion of their day at childcare centers. These centers play a role in getting preschoolers to meet PA guidelines. No study has currently examined preschoolers' PA prevalence during the preschool-day using the recently released Department of Health and Human Services (DHHS) PA guidelines. Therefore, the purpose of this cross-sectional study was to examine the prevalence of preschoolers meeting the 2018 DHHS PA guidelines during the preschool-day and the association between sex and meeting PA guidelines.

Methods: Data utilized for this study was from the Preschoolers Actively Learning (PAL) Study (n=47). PA was assessed using Actigraph accelerometers. PA prevalence during the preschool-day was defined as at least 105 minutes of total [light, moderate, and vigorous] PA during the 7-hour waking period of the preschool-day. Sex was obtained from parent questionnaires. Multivariate logistic regression analysis modeled the odds of meeting guidelines on sex.

Results: In our sample, 26% of the preschoolers met the DHHS PA guidelines and participated in 85±10.7 minutes of total PA during the preschool-day. Being younger was significantly ($p<0.05$) associated with meeting PA guidelines as compared to older age. In age-adjusted analyses, we found that boys had an increased odds of meeting the PA guidelines (OR=4.67; 95% CI: 0.95–22.87, $p>0.05$) but this was not statistically significant.

Conclusions: This study contributes to our understanding of PA prevalence in preschoolers during the preschool-day and sex differences associated with meeting PA guidelines. Findings highlight the need to target the preschool-day as a time frame to support preschoolers in meeting PA guidelines.

The impact of the COVID-19 pandemic on physical activity in Canadian adults and children

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Special Interest Group: G. Children and families (SIG)

Purpose: The abrupt changes in daily routines due to the public health response to COVID-19 has likely impacted physical activity patterns. The purpose of our study is to describe physical activity and sedentary behaviour patterns in relation to the COVID-19 pandemic among community dwelling adults and children.

Methods: Between April and June 2020, a random sample of 1124 adults (≥ 18 years) from north central Calgary (Alberta, Canada) completed an online questionnaire. The questionnaire captured data from adults and children (via caregiver proxy) including current walking, moderate (MPA), and vigorous (VPA) and sedentary behaviour, perceived changes in physical activity, sedentary, and social behaviours since the pandemic, anxiety, and sociodemographic characteristics. Data collection coincided with the first three months of the Alberta declared state of public health emergency. Descriptive statistics were estimated to describe current and perceived changes in patterns of physical activity and sedentary behaviour.

Results/findings: Our sample included data for 1047 adults (60.3% women; $\geq 19.2\%$) and 345 children (5-17 years; 55% girls). One-third of adults (32.9%) and caregivers (35.7) felt extremely or very anxious about COVID-19. Adults, on average, undertook 221.8 ± 202.5 min/week of walking, 170.9 ± 192.9 min/week of MPA, 173.6 ± 157.6 min/week of VPA, 196 ± 167.8 min/day of screen time, and 329.1 ± 221.3 min/day of sitting. Current total physical activity was higher ($p < .05$) and sitting time was lower ($p < .05$) among those who perceived their time outdoors had increased during the pandemic. The largest perceived change in behaviours included social distancing (increased), driving motor vehicles (decreased), use of screen-based devices (increased), watching television (increased), and interactions with neighbours (decreased). Children, on average, achieved ≥ 60 minutes of MVPA on 3.5 ± 2.4 days/week, spent 4.5 ± 2.7 days/week playing, and visited a park 4.8 ± 6.4 days/month. Most children spent ≥ 2 hours/day watching television (74.1%), using a computer/gaming (63.7%), and using screen-based devices (60.7%). During the pandemic, over half of all children had increased television watching (58.8%), computing/gaming (56.4%), and using screen-based devices (75.9%) and one-half had decreased playing at the park (52.7%) and public spaces (53.7%).

Conclusions: Encouraging adults and children to be physically active outdoors while maintaining physical distancing could support the accumulation of physical activity during the pandemic.

The impact of the experience of volunteer lifestyle coaching on health behaviours of coaches

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Special Interest Group: C. Cancer prevention and management (SIG)

Purpose: The ActWELL trial demonstrated that an intervention programme focussed on reducing breast cancer risk factors initiated within breast cancer screening and delivered by volunteer lifestyle coaches achieved a significant reduction in body weight at 12 months in women with a BMI >25kg/m². There is further interest in expanding volunteer support to increase community capacity for weight management but little is known about the experience of delivering lifestyle interventions on the health behaviours of those delivering the intervention.

Methods: Volunteer coaches for the intervention delivery were recruited and managed by the charity Breast Cancer Now. The charity recruited volunteers who had relevant experience with assisting people undertake life changes (e.g. nurses, teachers, church work) and they underwent a 2-day bespoke training programme focussing on physical activity, food choices and behaviour change techniques). Ongoing support (e.g. frequently asked questions, face to face sessions), was provided by the charity. In total, 39 coaches provided 623 face to face coaching sessions. At the end of study, coaches were asked to complete an anonymous eight item questionnaire with closed questions offering YES/NO/NOT RELEVANT responses and to provide further details. The items asked about personal lifestyle changes arising from being a coach and changes in personal lifestyle habits, body weight, health information seeking and communications on health with friends and family during the coaching period.

Results In total, 29 (74%) of coaches responded to the questionnaire and 82% of respondents provided detailed comments. Around a third (35%) reported that coaching had made them feel uncomfortable about their own health behaviours. Most (70%) reported (positive) changes to physical activity, with 43% highlighting changes in weight management practices and 37% reducing alcohol intake. Many (45%) reported seeking cancer prevention information using internet and media sources and specifically mentioning cancer charity sites. Most coaches also reported increased conversation with friends and family on weight management (71%), Physical activity (79%) and alcohol (52%).

Conclusion Volunteer coaching is associated with reported changes in health-related behaviours and advocating for changes in cancer related lifestyles by the coaches themselves.

The Intergenerational Effects of Parental Adverse Childhood Experiences on Child Physical Activity and Sedentary Behaviors: A cross-sectional study

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Special Interest Group: G. Children and families (SIG)

Purpose: Disparities exist in childhood physical activity, and ongoing research suggests that intergenerational trauma affects child health behaviors. The purpose of this study is to identify the association between parental adverse childhood experiences (ACEs) and child physical activity (PA) and sedentary behaviors (SB) in a racially and ethnically diverse sample.

Methods: Cross-sectional survey conducted with 1,295 parents of children (aged 6.9±1.5 yrs; 49% girls; 21% African American, 18% white, 17% Hmong, 17% Hispanic/Latinx, 16% Native American, 10% Somali) in Minneapolis/St. Paul, MN. Parent-reported ACEs were assessed through a 10-item survey; affirmative answers were summed. Parents also reported their child's usual weekly hours of light PA (LPA), moderate PA (MPA), and vigorous PA (VPA) and SB. Adjusted linear regressions evaluated the association between parental ACEs (high ACEs [≥5] vs. low ACEs [≤5]) and child's LPA, MPA, VPA and SB.

Results: Ten percent of the sample had a high ACEs score (≥5). On average, children of a parent with high ACEs engaged in more hours of weekly LPA (0.54; 95% CI 0.13, 0.95), MPA (0.71; 95% CI 0.3, 1.11) and VPA (0.3; 95% CI -0.11, 0.72) relative to children of a parent with a low ACEs score. Results showed similar levels of weekly hours of SB between children of parents with high or low ACEs. Relative to children of parents with a negative answer for individual ACEs items, children of a parent who had divorced parents (0.84; 95% CI 0.01, 1.67), had a family member in prison (1.37; 95% CI 0.16, 2.57), experienced food insecurity (1.25; 95% CI 0.07, 2.44), was physically abused (1.28; 95% CI 0.03, 2.53), and was sexually abused by a parent (3.66; 95% CI 1.6, 5.72) participated in more hours of weekday sedentary behaviors.

Conclusions: High parental ACEs were associated with more weekly hours per week of LPA and MPA, and individual ACE items were associated increased hours of weekday sedentary behaviors. The results of this study provide additional insight into how childhood trauma affects health behaviors in future generations.

The mediating role of emotional wellbeing in the relationship between income and adolescent physical activity: A study conducted during the COVID-19 pandemic

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Special Interest Group: G. Children and families (SIG)

Purpose: At the onset of the COVID-19 pandemic, the Canadian government responded to the economic fallout with income relief to support Canadian families in need. In addition to the financial consequences, the pandemic poses many challenges to overall mental and physical health. Families adapted to accommodate social distancing guidelines by reducing the frequency and size of gatherings resulting in reports of loneliness and emotional isolation. Limited access to recreational facilities and organized sports have also made it difficult for youth to be physically active. The present study assessed Canadian adolescent emotional wellbeing and physical activity during the COVID-19 pandemic. We also investigated whether emotional wellbeing mediated the pathways linking family income and adolescents' physical activity.

Methods: In May - June 2020, grade 7 British Columbian adolescents (N=265; 54% female; mean age=13 ± 0.1 years) and their mothers (N=259; mean age= 45.5 ± 5 years) completed an online survey assessing annual family income, mother and adolescent emotional wellbeing (i.e., self-esteem, optimism, depression and worry) and adolescents' physical activity. Mediation analysis conducted using M-plus 7.3 was used to examine the indirect effect of mother and adolescents' emotional wellbeing on the relationship between income and adolescents' physical activity.

Results: On average, adolescents partook in at least 10 minutes of physical activity 4 ± 2.4 days a week. We found a significant total effect of family income on adolescent physical activity (B = 0.21, SE = 0.07, 95% CI = [0.08, 0.34]) during the COVID-19 pandemic. This effect is explained by adolescents' emotional wellbeing (B = 0.07, SE = 0.03, 95% CI = [0.02, 0.14]) but no such pathway was found via mothers' emotional wellbeing.

Conclusions: Our study highlighted that family income via emotional wellbeing is associated with adolescents' physical activity levels. It is believed that the pandemic has widened financial disparities and our results suggest that, among other things, this may influence children's health behaviours such as engagement in physical activity. As physical activity has numerous health benefits, it is essential to enact policies that aim at reducing financial disparities to improve adolescent emotional wellbeing and engagement in physical activity.

The relationship between executive functioning and motor coordination skills of typically developing Grade 7 learners: NW-CHILD study

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Special Interest Group: F. Early care and education (SIG)

Purpose: As the literature about this topic in typically developing children is scarce, the aim of this study was to determine the relationship between executive functioning and motor coordination skills in typically developing Grade 7 learners, and if any gender- and socio-economic differences will occur regarding these skills.

Methods: This cross-sectional study formed part of a longitudinal NW-CHILD study. A Total of 271 learners (boys n=148; girls n=123), with a mean age of 12.95 (SD = 0.40) years, were tested. The BOT-2 was used to assess the children's motor coordination skills, while the TOLDX-2 was used to evaluate their executive functioning.

Results: There were no practical significance between executive functioning and motor coordination skills in the total group. However the boys and girls respectively had small correlations ($d=0.1$) between their executive functioning and motor coordination skills. This study also found gender differences ($p \leq 0.05$) between the boys and the girls, where the relationship between executive functioning and motor coordination skills were more evident in girls than in boys. The results of this study also suggested that the boys outperformed the girls in most of the BOT-2 and TOLDX-2 variables. Researchers found that the relationship between executive functioning and motor coordination skills are closely linked, even though the results of this study might indicate a slight difference with regards to this statement. This paper also aimed to determine if socio-economic status (SES) could have an impact and found that no significant correlations were found between motor coordination and executive functioning in high socio-economic groups, however bilateral coordination and the total correct score of the TOLDX-2 indicated a significant small correlation in the low SES group.

Conclusions: Due to limited research done on the relationship between executive functioning and motor coordination skills in typically developing children in South-Africa, this could be a great platform to inspire further research done on this issue. Multidisciplinary teams, such as Kinderkineticists, teachers, and other therapists, just to name a few, can benefit from interpreting these results in order to understand the close relationship between executive functioning and motor coordination skills and how they impact academic related skills.

The relationship between object control skills and health related physical fitness of nine to 10 year old boys in the North West province of South Africa: NW-child Study

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Special Interest Group: F. Early care and education (SIG)

Purpose: Well-developed object control (OC) skills provide boys with the self-confidence to participate in sports and are associated with higher health-related fitness (HRF) levels. Consequently, boys with inadequate OC skills will withdraw from participation in sports requiring these skills. There appears to be limited research regarding the relationship between OC skills and boys' HRF in South Africa. The study aimed to determine if there is a possible relationship between OC skills and HRF in boys aged nine- to 10 years in the North West Province of South Africa.

Methods: This study is part of the longitudinal NW-Child study (Child-Health-Integrated and Development), conducted over seven years (2010-2016). A cross-sectional study that made use of secondary data gathered in 2013 was used for this study. A total of 456 boys with an average age of 9.94 ± 0.41 years participated in the study. The Test of Gross Motor Development was used to assess the boys' OC skills. The Bruininks-Oseretsky Test of Motor Proficiency (BOT-2) was used to determine the boys' strength and the PACER test of the FITNESSGRAM was used to determine their cardiovascular endurance. Lastly, the body fat percentage was determined using the Body Mass Index (BMI) and skinfolds.

Results/findings: Various OC skills indicated small and statistically significant relationships (≤ 0.05 , $r \approx 0.1$) with various HRF skills. The striking a ball- and dribble skills respectively showed correlations with, standing long jump ($r=0.10$; $r=0.16$) and V-ups ($r=0.13$; $r=0.10$). Furthermore, the dribble, catch and underhand roll showed correlations with push-ups ($r=0.17$; $r=0.12$; $r=0.12$) and sit-ups ($r=0.25$; $r=0.11$; $r=0.17$). The overhand throw only showed correlations with sit-ups ($r=0.15$). No correlations were found between the kicking skill and any of the strength sub-items. The dribble, catch, kick and underhand roll found correlations with cardiovascular endurance ($r=0.11$; $r=0.12$; $r=0.14$; $r=0.16$), whereas the overhand throw only showed a correlation with BMI ($r=0.10$). No correlations were found between the various OC skills and body fat percentage.

Conclusions: The results observed that OC skills could influence most of the HRF activities. Therefore, more attention to boys' OC skills and HRF is required to prevent possible sport participation backlogs.

The role of child self-efficacy and parental support on youth physical activity in a pilot intervention

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Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: The behavioral strategies that impact changes in physical activity (PA) for high-risk youth remain unclear. This study examines self-efficacy and parental support for PA as key factors associated with changes in child PA observed during a 6-week pilot PA intervention for high-risk middle school youth

Methods: Participants (9-14 years) from five public schools were enrolled in the 6-week pilot program, delivered remotely at home, during the summer of 2020. Based in social cognitive theory, the program included daily text-messages for parents and youth from a health coach, access to a private YouTube channel with sport and exercise videos, and three home deliveries of sport equipment. Parents and children completed baseline and follow-up surveys including child PA self-efficacy and self-reported PA, as well as parental support for PA. Data were analyzed using repeated measures multivariate analyses of covariance (RM-MANCOVA).

Results/findings: 34 parent-youth dyads completed baseline and follow-up surveys (mean age 12.1 [SD= 1.27] years, 67.6% male, 85.3% Black/African American).

The RM-MANCOVA results indicate changes in both self-reported PA ($F(1, 33) = 9.64$; $p = .004$) and PA self-efficacy ($F(1, 33) = 5.471$; $p = .026$) were statistically significant. Pairwise comparisons indicate self-reported PA ($\Delta M = 4.21$, $SE = 1.21$) and PA self-efficacy ($\Delta M = .385$, $SE = .17$) increased from baseline to follow-up. When parental support for PA was included as a covariate, only change in self-reported PA was statistically significant ($F(1,33) = 15.77$; $p < .001$). Multivariate tests indicate parental support for PA had a positive main effect ($F(2,31) = 9.28$; $p = .001$) and negative interaction effect ($F(2,31) = 4.60$; $p = .018$) on self-reported PA, indicating parental support for PA was positively associated with self-reported PA and that youth with lower parental support for PA at baseline actually experienced greater increases in self-reported PA.

Conclusions: Camp From Home participants reported increased PA self-efficacy and self-reported PA at the end of the 6-week pilot study. The increase in PA self-efficacy was explained by parental support for PA. Participants with lower perceived parental support experienced greater increases in self-reported PA suggesting that a remote home-based PA program might be more efficacious for high-risk youth with less parental support for PA.

U.S. families' food acquisition and restaurant use during the COVID-19 pandemic: Findings from a nationally representative survey

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Special Interest Group: G. Children and families (SIG)

Purpose: The COVID-19 pandemic caused drastic changes in U.S. families' daily lives, with evidence of short-term impacts on food acquisition and eating behavior. More recent behaviors are less understood and may reflect a "new normal" following relaxation of protection measures in many regions. A survey was administered in October 2020 to assess reported impacts of the pandemic and current family food-related behaviors in a nationally representative sample of U.S. parents.

Methods: An online survey was administered to U.S. parents with at least one 4-to-8-year-old child (n=1000). Questions included parent-reported impacts of COVID-19 on daily life and food acquisition, as well as current food security and restaurant use. Frequencies, means, and standard errors were calculated, incorporating sampling weights based on sociodemographics.

Results: Parents reported increased working from home, decreased work hours, and increased child care and instruction due to COVID-19, with a majority of children attending school virtually or being homeschooled. About two-thirds of parents reported preparing food at home more often, 44% reported using take-out/delivery less often, and 33% reported using restaurant take-out/delivery more often than before. About half of parents reported that their child dined at restaurants, 62% reported getting take-out, and 57% reported delivery from restaurants at least 2-3 times per month during the past two months. Parents reported convenience and taste as the most important reasons for ordering take-out/delivery. About half believed it was very or somewhat safe to dine at restaurants, and take-out and delivery were believed to be safe by 74% and 77% respectively. Approximately two-thirds of parents reported food insecurity in the previous two months.

Conclusions: Results illustrate some possible longer-lasting shifts in family life, including children spending more time at home, high food insecurity, and increased home cooking. Many families are using restaurants at this point in the pandemic, with some variability in their use and perceived safety. Continued surveillance can aid in understanding the extent to which the COVID-19 pandemic may have catalyzed changes in energy-balance-related behaviors that can have lasting impacts on health and well-being. Sociodemographic differences and implications for future research and policy will be discussed.

University students' social media use and social connectedness during the COVID-19 pandemic

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Special Interest Group: L. Other

Purpose: Public health restrictions related to the COVID-19 pandemic have posed exceptional challenges for maintaining social connections, particularly for young people. The purpose of this study was to examine university students' social media use (e.g., frequency, reported changes in use) and perceptions of online and in-person connectedness at the beginning of the COVID-19 pandemic in Ontario.

Methods: Data from a larger cross-sectional survey-based study (iBelong Phase 1) were used for the purpose of the present study. Participants were eligible for inclusion if they were enrolled as a student at any university in Ontario during the time of data collection (March/April, 2020). Only those who completed survey questions pertaining to social media use, online connectedness, and in-person connectedness were included in the present study.

Results: A large sample of university students ($n = 1635$; $M_{age} = 22.38$, $SD = \pm 5.08$) provided data for the present study. Analyses revealed that 97.9% of participants reported using social media; of these, 69.7% reported 3+ hours of social media use per day, and 85.4% reported that their use had increased "somewhat" or "greatly" during the pandemic. With regard to social connectedness, students reported feeling socially connected online ($M_{item} = 3.80$, $SD = 0.67$) as well as in-person ($M_{item} = 4.39$, $SD = 0.81$), as evidenced by mean item scores ≥ 3.5 .

Conclusions: Generally speaking, university students reported relatively high levels of social media use and social connectedness—both online and in-person—at the beginning of the pandemic. These results, in conjunction with those stemming from our current and ongoing work in this area, will be discussed and explored further within the context of the pandemic and current literature.

Using Self-reported Activities To Contextualize Accelerometer-measured Sedentary Behaviors And Patterns Among Women With Breast Cancer

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Special Interest Group: C. Cancer prevention and management (SIG)

Purpose: Breast cancer is the second leading cause of cancer deaths among U.S. women. In 2014-2018 44% of the women that died from breast cancer were between the ages of 65-84. Sedentary behavior is related to mortality among women with and without breast cancer. The context and patterns in which women with breast cancer accrue their sedentary time is unknown.

Methods: Overall, 5,141 women (mean age= 78.4 ±6.7) from the Objective Physical Activity and Cardiovascular Health (OPACH) Study, an ancillary study to the Women's Health Initiative (WHI), were classified into three groups: those with breast cancer (n=350), with any other cancer (n=528), and those without cancer (n=4,263). Participants self-reported time spent sitting in common sedentary behaviors. G3TX+ triaxial accelerometers measured sitting time and patterns of sitting for 7 days. Self-reported and accelerometer-measured sitting measures were summarized, with results displayed in radar plots. Pairwise comparisons tested differences between groups.

Results: Mean (SD) self-reported hours/day were: watching television=3.1 (1.5); reading or doing crafts=1.7 (1.2); on the computer=1.0 (1.1); in transportation=0.9 (0.7); working without a computer=0.8 (0.8); and talking on the phone=0.7 (0.7). The only significant difference was for television watching (p=0.02), women with breast cancer watched 11.8 minutes/day more than women with no cancer, adjusting for age and race-ethnicity. Women with breast cancer had 15 more minutes/day of sedentary time (634 vs. 619, respectively; p-value < 0.001), and had longer sitting patterns (13.2 vs. 12.4 minutes/day; p-value < 0.001) than women without cancer.

Conclusions: Women with breast cancer have more prolonged sedentary behavior patterns than women without cancer. Findings can inform tailored interventions to raise awareness among women with breast cancer with high levels of sitting, particularly while watching television, and can be used to encourage less sitting in shorter bouts to reduce sitting patterns. Future studies should examine the extent to which reduced sitting patterns enhance the health and well-being of women with breast cancer.

Using the Behaviour Change Wheel to Develop Text Messages to Promote Diet and Physical Activity Adherence Following a Diabetes Prevention Program

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Special Interest Group: D. e- & mHealth (SIG)

Purpose: Improvements to diet and physical activity (PA) can reduce risk of developing type 2 diabetes (T2D); however, long-term adherence to diet and PA is poor. In order to influence T2D risk at a population level, scalable interventions are needed to facilitate behaviour change adherence. Text messaging interventions are a cost-effective way to improve long-term diet and PA changes; however, they often fail to report on theoretical underpinnings of message development. Study aims: describe the development of a bank of text messages to support diet and PA behaviour change adherence following a diabetes prevention program using the Behaviour Change Wheel (BCW). The BCW is a synthesis of 19 behaviour change frameworks which provides structure to intervention design and has been used extensively in health behaviour change interventions.

Methods: The following stages of the BCW were followed: (I) target behaviours and barriers/facilitators to engaging in them; (II) intervention options and policy categories; and (III) relevant behaviour change techniques (BCTs) associated with selected intervention options. A library of text messages was then written to map onto identified BCTs and was coded for BCT fidelity by an independent reviewer trained in BCT identification.

Results: Target behaviours included adherence to diet and PA recommendations. Sixteen barriers/facilitators and 28 associated BCTs were identified through previous qualitative work. One hundred and twenty-four messages were written based on selected BCTs and following the fidelity check, a total of 43 unique BCTs were included in the final bank of messages.

Conclusions: While other research has utilized the BCW to develop text messaging interventions, this is first, to our knowledge, to have an independent coder assess BCT classification in the final message development as a form of fidelity check. This additional step proved imperative in developing a comprehensive picture of the active components within the current bank of messages. By reporting on the theoretical underpinnings and mechanisms of action within text messages, future research can understand not only if these messages are effective, but also why certain messages may be more or less effective, and what combination and dose of messages can optimally influence behaviour change.

Waking Up to Sleep's Role in Weight Gain and Blood Pressure among Predominantly Black Adolescent Girls in Low-Income, U.S. Urban Communities: A Longitudinal Latent Profile Analysis

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Special Interest Group: I. Socio-economic inequalities (SIG)

Purpose: In the U.S., Black adolescent girls living in low-income communities experience high rates of obesity, low diet quality and physical activity, and short sleep duration. In a sample of Black adolescent girls, we aimed to identify longitudinal reciprocal associations between unique sleep patterns and cardiometabolic factors.

Methods: We used longitudinal data from a multilevel school-based randomized controlled trial aimed at improving diet and physical activity behaviors among adolescent girls. Nocturnal sleep data (total sleep time, sleep quality) were extracted from omnidirectional accelerometers worn > 7 days at T1 (enrollment, n = 556), T2 (6-month follow-up, n = 419), and T3 (18-month follow-up, n = 329) using a validated algorithm. We measured height and weight at Time 1-3 (calculated z-scores for body mass index, zBMI) and systolic and diastolic blood pressure (SDBP) at T1 and T3 using a digital oscillometric monitor (values normalized for U.S. adolescents). We used longitudinal latent profile analysis on sleep minutes/efficiency to derive mutually exclusive sleep profiles with discrete change over time. We used poisson models with robust variance to examine whether T1 zBMI and SDBP predicted sleep profiles, and linear regression models to examine if sleep profiles predicted T3 cardiometabolic factors (BMIZ, SDBP), controlled for age, race, and Tanner score.

Results: At enrollment, girls were mean 12.2 years old (+ 0.72), 48.6% had overweight or obesity, systolic and diastolic at the 59th and 39th percentiles, respectively. At T1, girls had valid sleep data for 4.8 nights, mean nighttime sleep of 7.9 hours. Girls followed two sleep profiles: regular (86%) or irregular (13%), with no demographic or cardiometabolic differences between the profiles. T1 BP predicted sleep profile; girls had a lower likelihood of following a regular sleep trajectory for each additional point in systolic percentile at T1 (Prevalence Risk Ratio = 0.99; 95% CI: 0.98, 0.99).

Conclusions: Girls with higher-than-average systolic BP were more likely to have an irregular sleep trajectory. Determining the sources of vulnerability in health behaviors experienced within each of these groups, such as short sleep duration and poor sleep quality, provides opportunities to intervene to disrupt chronic disease risk and address disparities

Watching television during mealtimes is associated with higher discretionary food intakes in young Australian children: A two year prospective study

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Special Interest Group: G. Children and families (SIG)

Purpose: Many children watch television during mealtimes which has been cross sectionally associated with poor diets. The aim of this study was to assess the prospective association between baseline mealtime television use and subsequent 2-year intakes of discretionary food, fruit and vegetables in young children. Additionally, to assess whether the associations differ by socioeconomic position (SEP).

Methods: This prospective study, conducted in 2014 and followed up two years later, surveyed parents of young Australian children, aged 6 months to 6 years. Parents reported their children's weekly mealtime television frequency during breakfast, lunch, dinner and snack time, children's discretionary food intakes over the past month, and usual daily consumption of fruit and vegetables. Responding parent education level (university-education vs non-university educated) was used as a proxy for SEP. Multivariable linear and logistic regression analyses with adjustment for baseline intakes, child gender, child age, family meal frequency and meal location were performed to assess the association between baseline mealtime television use and intakes of discretionary foods, fruit and vegetables at the follow up. Stratified analyses were conducted to assess if the association differed by SEP.

Results: Analyses included 352 children. Overall mealtime television use (occasions/week) was associated with 2 years' subsequent higher daily intake frequency of discretionary food (β 0.02, 95%CI 0.01-0.04). For individual mealtimes, television use during breakfast and dinner 1-2 days/week, compared to never, predicted higher daily intake frequency of discretionary food, β 0.18 (95%CI 0.02-0.37) and β 0.19 (95%CI 0.00-0.39), respectively. Similarly, 3-7 days/week of television during breakfast and lunch predicted higher daily intake frequency of discretionary food, β 0.18 (95%CI 0.02-0.37) and β 0.31 (95%CI 0.07-0.55), respectively. No significant associations were seen between mealtime television use and prospective vegetable or fruit intakes. There were few socioeconomic associations between mealtime television use and intakes.

Conclusions: Developing strategies to limit television during mealtimes may be a useful component of interventions for addressing the high consumption of discretionary foods in young children. Such strategies are likely to be applicable across the socioeconomic spectrum, though particularly relevant to low SEP populations with greater frequency of television viewing during mealtimes.

Web-based planning tool for the prevention of obesity in childhood and youth (WEPI) – findings of the first trial period

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Special Interest Group: D. e- & mHealth (SIG)

Purpose: Obesity prevention often has an insufficient quality of planning, which can influence the intervention's success. The systematic and theory-based development of interventions is complex and requires time as well as personnel resources. With WEPI we aim to develop a web-based planning tool for municipalities and schools, that follows the evidence-based intervention mapping approach (IMA) but also supports the planning process of obesity prevention time saving and user-oriented. The project is supported by the Federal Ministry of Health, Germany.

Methods: To meet the requirements of the IMA, two systematic literature reviews (SLR) were conducted in the databases Pubmed, LIVIVO and Cochrane on evidence-based determinants of obesity development and on proven obesity intervention methods. Because of Covid-19 the first version of WEPI was virtually tested with selected municipalities and schools in October 2020. In addition, the second version was reflected and discussed in a virtual meeting with experts from health promotion. The prototype as a third version was tested by three municipalities and two schools in February 2021. Feedback was collected through questionnaires and telephone interviews.

Results: The first SLR revealed 806 hits. Evidence-based determinants for the development of obesity were identified in 8 guidelines and 37 reviews. They were adopted for WEPI in form of 15 problem areas. Based on these problem areas, the WEPI user can conduct an evidence-based problem analysis. The result of the second SLR are 25 obesity prevention interventions that were developed using the IMA. Evaluated methods of these interventions were integrated into the planning tool and recommended as good practice. In the first trial the expert feedback revealed aspects of content and user-friendliness as well as technical aspects that should be optimized in the WEPI planning tool. The feedback of the municipalities and schools underlines, that scientific findings need to be translated into practical logic.

Conclusions: Using WEPI, prevention planning becomes more evidence-based and user-oriented. The intervention's standardization and quality assurance are guaranteed as the planning process is transparent and supported by scientific content. In the next step, WEPI will be tested and evaluated with municipalities and schools from March to December 2021.

What makes up an effective diabetes prevention program: identifying behaviour change techniques and motivational interviewing techniques in a community-based program for adults at risk for type 2 diabetes

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Special Interest Group: B. Motivation and behavior change (SIG)

Purpose: Diet and physical activity programs are effective at reducing one's risk of developing type 2 diabetes (T2D); however, it is not known what specific techniques lead to optimal outcomes. When developing and implementing diabetes prevention programs in the community, it is imperative that intervention components are thoroughly and consistently reported to understand program effectiveness and help with scaling up. Small Steps for Big Changes (SSBC) is an evidence-based diabetes prevention program that consists of six one-on-one sessions with a coach. Coaches deliver diet and physical activity content to clients using behaviour change techniques (BCTs) and motivational interviewing (MI). BCTs are the specific active intervention components, and MI techniques describe the relational aspects of how intervention components are delivered. By reporting BCTs and MI techniques, future researchers can better replicate the components and the delivery style of an intervention. The purpose of this study was to comprehensively identify the BCTs and MI techniques within SSBC.

Methods: BCTs and MI techniques were coded within each of the six SSBC session protocols using the BCT Taxonomy v1 and the Table of MI Techniques. To ensure reliable coding, two coders completed the BCT coding and two coders completed the MI techniques coding. Interrater reliability was assessed.

Results/findings: Forty-three BCTs (interrater reliability [κ]=0.77) and 20 MI techniques (κ =0.63) were identified within the SSBC protocols (mean BCTs/session=30; mean MI techniques/session=16). SSBC sessions specifically focussed on the BCT categories of "Goals and Planning", "Feedback and Monitoring", and "Repetition and Substitution", and the MI technique processes of "Engaging" and "Evoking".

Conclusions: Detailed reporting of intervention components are necessary for future reviews to accurately test which intervention components are effective in eliciting change in desired outcomes. This study revealed the use of a greater number of BCTs in the SSBC program compared to the numbers of BCTs reported in a number of T2D programs. In general, more thorough reporting of BCTs used in interventions will progress the field of health behaviour change. Further, the detailed reporting of the specific techniques within SSBC can be used to inform development of future diabetes prevention programs.

What you do is who you are: Do health behaviors matter for cultural identity formation, and why is it important?

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Special Interest Group: G. Children and families (SIG)

Purpose: Individuals with a migrant background are still severely underrepresented in health research, and research on individual factors or mechanisms associated with integration and well-being in migrant populations is scarce. Following social identity and acculturation theory, we address this research gap by examining the relation of cultural identity (integrated, assimilated, separated, and marginalized), an indicator of emotional integration, with health behaviors and health outcomes.

Methods: Data from N = 7,449 adolescents with migrant background from the CILS4EU study, a multinational panel, were analyzed using multivariate analysis of variance (MANCOVAs). Follow-up ANCOVAs and post-hoc tests were used to investigate differences in health behaviors (physical activity, having breakfast, having a hot meal, hours of sleep, consumption of alcohol, cigarettes, and drugs) and health outcomes (life satisfaction, internal and external mental health problems, self-esteem, academic self-efficacy, and general health) for the different identity types.

Results/findings: The MANCOVAs showed significant differences between the types of identity on the combined health behaviors ($V = .03$, $F(3, 13401) = 6.4$, $p < .001$) and health outcomes ($V = .03$, $F(3, 13335) = 7.2$, $p < .001$). For health behaviors, the types of cultural identity showed significant differences in physical activity, the frequency of having breakfast, and alcohol consumption ($F_s > 9.8$, $ps < .001$). No differences were found for the frequency of having a hot meal, smoking, and consuming drugs. Except for general health, cultural identity types showed significant differences in all health outcomes ($F_s > 9.0$, $ps < .001$). Post-hoc tests showed that for the frequency of having breakfast, alcohol consumption, self-esteem, and self-efficacy, the integrated identity showed better outcomes than the assimilated identity ($F_s > 7.1$, $ps < .01$).

Conclusions: Cultural identity is not only a key determinant of integration but also linked to various health outcomes and behaviors. The results support selective acculturation theory and question whether national affiliation alone is the most beneficial health strategy. As health behavior change interventions seem not to reach migrants, innovative interventions incorporating and enhancing cultural identity formation could improve health behavior, resiliency, and health on a global level.

Who are the key influencers providing physical activity information to adolescents? Lessons from the first COVID-19 lockdown

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Special Interest Group: G. Children and families (SIG)

Adolescence is an important life stage that bridges childhood and adulthood. During this critical phase of growth and development, youth lifestyle choices can be health protecting or health risk behaviours. In high-income countries, the influence of family wanes while the influence of peers becomes more salient. Yet, little is known about the role of social media and online 'influencers' of physical activity (PA) behaviour. School closure due to the COVID-19 pandemic catapulted adolescents into online schooling. The purpose of this study was to examine who the key influencers of PA behaviour across school-age adolescents were during the first COVID-19 lockdown.

In the Autumn term of 2020, seven second-level schools, as part of the Active School Flag feasibility study completed a whole-school survey. Items were framed to the period of the lockdown in March-April 2020. Pilot and cognitive testing were conducted for reliability and construct validity of the items. Adolescents reported how much they agreed (1-strongly disagree, 5-strongly agree) with the use of online PA information given by; i) family member, ii) friends, iii) sport coach, iv) teacher, v) TV or YouTube celebrity, vii) bloggers. One way ANOVA (REGWQ post-hoc tests) were used to emphasis changes in the scores as adolescents get older, stratified by gender.

The items were understood as intended, as evidence from cognitive test results. Adolescents aged between 12-17y old (n=3204, 62.5% females) reported teachers as the lowest influencer (mean=2.07, SD=.83) and sport coaches as the highest (mean=2.52, SD=0.77). Influence of friends remained stable across the ages, but sport coaches ($p<.001$, $\eta^2=.011$), family ($p<.001$, $\eta^2=.031$) and teachers ($p<.001$, $\eta^2=.024$) declined for both males and females with age. Despite the decline with age, sport coaches remained the most influential among the oldest adolescents. Among females, celebrities ($p<.001$, $\eta^2=.028$) and bloggers ($p<.001$, $\eta^2=.019$) influence increased with age.

Sport coaches need access to all adolescents to provide information. Although, change in other influencers during lockdown as adolescents got older would suggest the need to tailor programs for different age groups across second-level education. The role of online celebrities or bloggers increases with age among female adolescents.

Workplace Sedentary Behavior and Productivity: A Cross-Sectional Study

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Special Interest Group: K. Disease prevention and management

Purpose: Reducing sedentary behavior in the workplace has become an important public health priority; however, some employers have expressed concerns regarding the potential for reduced productivity if employees are not seated while at work. Therefore, the aim of this study was to determine the relationship between workplace sedentary behavior (sitting time) and work productivity among full-time office-based employees, and further to investigate other potential factors that may be associated with productivity.

Methods: An online 19-item self-report survey was developed using existing validated questionnaires and was completed by 2,068 government employees in Kansas. The survey assessed workplace sedentary behavior as a percentage of time spent sitting during an average workday in the past week, as well as work productivity, job satisfaction, and fatigue over the previous 7 days. A 3-step linear regression analysis (entry method) was used to determine the association between sitting time and productivity with statistical adjustment for potential confounding variables. Changes in R² were determined at each step. Additional analyses were conducted to determine differences in productivity, job satisfaction and fatigue index by three levels (lowest, middle, and highest) of percentage of time spent sitting during a typical workday.

Results/findings: Overall, office workers reported high levels of sedentary time (mean > 78%). The primary results indicated that sitting time was not significantly associated with productivity ($\beta = 0.013$, $p = 0.519$), but job satisfaction and fatigue were positively ($\beta = 0.473$, $p < 0.001$) and negatively ($\beta = -0.047$, $p = 0.023$) associated with productivity, respectively. Furthermore, participants with the highest level of sitting time (>91% of the time) reported lower job satisfaction and greater fatigue as compared with the lowest level of sitting time (<75% of the time).

Conclusions: The primary results of the current study indicated that there was not a significant association between workplace sedentary behavior and productivity among this sample of full-time government office workers when using self-report measures. However, taken together, these results offer promising support that less sitting time is associated with positive outcomes that do not seem to come at the expense of productivity.