



**Scottish Physical Activity Research Connections 2019**  
**6 November, John McIntyre Conference Centre, University of**  
**Edinburgh**

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**THE UNIVERSITY of EDINBURGH**  
**Physical Activity for Health**  
**Research Centre (PAHRC)**



## Oral Abstracts

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1. “Your Go To Guide to Physical Activity”: A communications approach to support health professionals refer patients to physical activity opportunities

Presenting Author: Chris Kelly (Health Improvement Senior, NHS Greater Glasgow and Clyde Health Improvement)

Authors: Chris Kelly, Chloe McAdam and Fiona Watt

In the context of WHO’s systems-based approach to physical activity, health care plays a key role in supporting people to become more active. In Scotland this is via the implementation of the National Physical Activity Pathway and Health Promoting Health Service. Improved communications can assist more health professionals to routinely raise the issue of physical activity with their patients.

Aim: To increase referrals to physical activity (PA) services from health professionals in NHS Greater Glasgow and Clyde (NHSGGC) via improved communication and marketing materials.

Background: Health care systems play a key role in supporting people to become more active. In NHSGGC, health professionals can signpost patients to three PA services: Health Walks, ‘Vitality’ (functional based fitness classes), and ‘Live Active’ (Exercise Referral Scheme). However, health professionals report insufficient time and skills and complicated referral processes as barriers to signposting patients to PA (FMR Research, 2002; Wheeler et al; 2017).

Methods: A needs assessment was conducted with health professionals via electronic survey. Questions included knowledge of PA guidelines, awareness of local PA interventions and barriers to referral.

In response, NHSGGC developed ‘Your Go To Guide To Physical Activity’. This guide included a comprehensive communications approach for PA services and provided health professionals with a briefing document; webpage; simplified referral process; and a single-point of access telephone line. The materials highlighted key ‘calls to action’.

Referral rates to Live Active were tracked before and after the launch of ‘Your Go to Guide to Physical Activity’. It was not possible to track signposting to the other PA services.

Results: 256 health professionals responded to the survey. Respondents included physiotherapists (42%), nurses (28%), GPs (9%) and consultants (4%), with 17% from ‘other’ job roles. There was high awareness of CMO’s recommendations for PA (83%) and of NHSGGC’s PA services (96%). Nearly one third (30%) of health professionals reported never or infrequently referring patients to Live Active, and amongst these, barriers included complicated referral process, poor knowledge of the service and patient suitability.

Referrals to Live Active increased by 75% following the launch of ‘Your Go To Guide To Physical Activity’ (4032 in 2015/16 to 7060 in 2018/19). Additionally, there has been a 192% increase in referrals from acute settings from 2014/15 to 2018/19 (from 815 to 2377).

Conclusion: Tailoring and simplifying communication, marketing materials and referral systems can support health professionals to refer more patients to physical activity opportunities and facilitate the delivery of National Physical Activity Pathway and Health Promoting Health Service.

## 2. Effectiveness and acceptability of a novel, time-efficient, workplace-based exercise intervention for improving general health in sedentary employees

Presenting Author: Niels Vollaard (Lecturer, University of Stirling, Faculty of Health Sciences and Sport)

Authors: Dr Niels Vollaard, Dr Richard Metcalfe and Dr Hady Atef

This study investigates a novel intervention for improving the general health and well-being of sedentary office workers. The time-efficient exercise intervention (total time-commitment of 20 min/week) has previously been shown to be efficacious at improving the important health marker of maximal aerobic capacity in a lab-based setting, but this is the first study to investigate its 'real-world' effectiveness and acceptability.

Background: Despite the importance of sufficient physical activity for good health, many people remain inactive. As most employees spend ~half of their waking hours at work, the workplace has been proposed as an ideal setting to implement exercise interventions. We have previously developed a time-efficient exercise intervention (termed reduced-exertion high-intensity interval training (REHIT); total time commitment of 20 min/week) that is efficacious at improving the important health marker of maximal aerobic capacity ( $\dot{V}O_2\text{max}$ ) in a supervised lab-setting. To date, it has not been investigated whether REHIT is suitable for implementation in a 'real-world' setting.

Aim: To determine the 'real-world' effectiveness and acceptability of a 6-week workplace-based REHIT intervention for improving maximal aerobic capacity.

Methods: Twenty-nine sedentary office workers (12 men; mean $\pm$ SD age: 47 $\pm$ 9 y, BMI: 27.4 $\pm$ 4.3 kg·m<sup>-2</sup>,  $\dot{V}O_2\text{max}$ : 28 $\pm$ 7 mL·kg<sup>-1</sup>·min<sup>-1</sup>) were randomised to an exercise group (n=16, 6 men) or a no-exercise control group (n=13). Participants in the exercise group performed 2 REHIT sessions per week for 6 weeks, involving 10 min of low-intensity (~25 W) cycling interspersed with two 10-20 s all-out Wingate-type sprints. All exercise sessions were performed unsupervised within the participants' workplace.  $\dot{V}O_2\text{max}$  and questionnaire-based measures of enjoyment of exercise (PACES), exercise task self-efficacy, and intervention acceptability were assessed at baseline and following the 6-week intervention period. Four participants dropped out of the study (exercise group: n=3; provided reasons: unrelated back-pain, unrelated work accident, and lightheadedness following exercise; control group: n=1; no reason provided). An average of 90% of prescribed REHIT sessions were completed.

Results:  $\dot{V}O_2\text{max}$  significantly improved in the exercise group (2.25 $\pm$ 0.75 L·min<sup>-1</sup> vs. 2.42 $\pm$ 0.82 L·min<sup>-1</sup>; +7.4%) compared to the control group (2.22 $\pm$ 0.72 L·min<sup>-1</sup> vs. 2.17 $\pm$ 0.74 L·min<sup>-1</sup>; -2.3%; time x intervention interaction effect: p<0.01). Questionnaire-data suggested that the participants in the exercise group considered the REHIT intervention enjoyable (PACES: 89 $\pm$ 17 out of 119) and acceptable, and were confident in their ability to continue to perform the REHIT intervention (7.8 $\pm$ 1.2 out of 9).

Conclusions: Our data demonstrate that REHIT can be implemented as an effective and acceptable exercise intervention for improving cardiorespiratory fitness in a workplace setting, with a total time-commitment of just 20 minutes per week.

### 3. Creating a Cultural Norm for Active Travel in NHS workplaces

Presenting Author: Kirsty Rankin (Behaviour Change Coordinator Workplaces, Sustrans)

Authors: Kirsty Rankin, Christopher Topping (NHS D&G), Dan Jenkins (NHS Highland)

Evidence demonstrates that active travel is an effective way to incorporate physical activity into the daily routine and can enable the inactive to become, and remain, active. Nationally however, only 14% of commuters walk or cycle. Sustrans Scotland developed the Workforce Engagement Project to increase active travel in NHS staff and integrate it into the core business of the NHS.

The project aims to:

- understand the barriers to workplace active travel
- overcome these barrier and increase active travel and physical activity levels of NHS employees
- develop infrastructure that enables active travel
- embed active travel in NHS organisational policy and achieve a cultural shift where active travel is normalised

Method: A mixed methods approach was applied including:

- activity logs
- pre/post survey measuring changes in active travel and physical activity
- Interviews
- Health Economic Assessment Tool (HEAT)

Results: Year one survey results reported increases in active travel and physical activity across projects:

- Single occupancy car use decreased from 63.6% to 55.3%.
- Employees cycling to the new D&G Royal Infirmary increased from 6.8% to 14.8%.
- Bus patronage increased from 2.8% to 8.2%.
- Self reported staff physical activity rates among staff have been seen to increase from 59% to 88%.

Active travel has been integrated into NHS core business, including the development of active travel policies and inclusion as a standing item on meeting agendas/ staff inductions.

Ten sites have achieved Cycle Friendly Status.

The project has generated £100,000 investment secured to deliver:

Bike repair stations; shelters; building improvements and bespoke maps

E-Bike schemes across acute and primary care teams along with a pilot with the Transport Fleet.

Learning is being consolidated within an NHSlearnpro for use in other sites and Boards.

Economic Value >£25 million (both projects, based on 5yr HEAT modelling)

Conclusion: The NHS workplace engagement project has created a cultural shift in the travel behaviours within two Health Boards. This was achieved by overcoming barriers and creating the capacity and environments that prioritise and normalise active travel. The project is being expanded to include NHS Shetland who face significant barriers to active travel and high levels of transport poverty. The learning of this project can be used to inform behaviour change approaches in other workplace settings.

4. How do we effectively communicate physical activity related evidence to children: A rights-based, co-production model to creating educational resources?

Presenting Author: Dr Paul McCrorie (Research Fellow, MRC/CSO Social and Public Health Sciences Unit, University of Glasgow)

Authors: Paul McCrorie, Anne Martin, Julie Riddell, Enni Pulkkinen, Gillian Bell, Avril Johnstone, Aidan Gallacher, Orlaith McAree, Katie Reid

Under Outcome-3, the Framework notes that teachers/others working with children and young people need to be supported to raise awareness of the benefits of PA, and increase their confidence in integrating PA into their work. Our abstract presents phase-1 of a co-produced (with children) set of resources to support educators encourage and enable activity, competence, and confidence in children.

Background: Educational resources for promoting PA in children exist, yet few have been developed putting children - and their rights - at the centre of the process. As such, their usability/acceptance may be sub-optimal. There is a unique opportunity to work with children, embedding their experiences and expertise throughout resource development.

Aim: Using the findings from our SPACES study, and employing a rights-based co-production model, our aim was to develop an understanding of how best to translate and communicate PA related evidence with children.

Methods: Facilitated by project partners Children's Parliament and Agile CIC, children (aged 9-11, n=43) from two primary schools across Edinburgh/Borders participated in three half-day interactive workshops:

1. "What is physical activity?" employed two participatory games: a 'day in the life' and 'Agree/Disagree': the former exploring how PA can be accumulated daily; the latter evaluating PA related evidence. The workshop was framed around the United Nations Convention on the Rights of the Child.
2. "What does this mean to children?" explored the SPACES research topics including gender and urban/rural differences in PA levels, the impact of the built and natural environment (e.g. seasonal variation), and social factors (e.g. relationships) that may influence PA behaviours.
3. "How to share these messages" focused on translation of the SPACES study evidence, and the formation of 'top tips' and 'calls to action' to assist with developing resources.

Findings: Although some children identified positive aspects ("keeping fit", "having fun"), others associated PA negatively ("fainting from exercise", "tiresome"), or predominantly as sport or exercise. Children suggested resources be colourful and vibrant; fun, humorous, light-hearted, uplifting and encouraging; include 'memes', storytelling, and/or animated tutorials to convey key messages. Resources should address physical and social barriers/facilitators and must recognise inclusivity (e.g. those with disabilities).

Conclusion: Our long-term ambition is aligned with all six of the Active Scotland Outcomes and our initial findings inform two further stages: i) The development, piloting, optimisation, and evaluation of resources that align to Curriculum for Excellence; ii) In partnership with Agile CIC, we will host and promote our materials through 'Actify', Scotland's first digital platform for practical PA resources.

5. Text-messaging intervention to improve physical activity and sedentary behaviour in adolescents: A qualitative pilot study exploring feasibility, preferences and effectiveness

Presenting Author: Kim Ludwig (PhD Student, University of the West of Scotland, School of Health & Life Sciences)

Authors: Kim Ludwig (MSc), Dr Rosie Arthur, Dr Duncan S Buchan

This study presents a vital insight into user preferences of text-messaging-based physical activity interventions for youth. Research in this area is limited despite these interventions offering a low-cost, wide-reach approach to promoting health and well being among adolescents from different backgrounds. Further, our work contributes to the evidence base of effective, theory-based health promotion interventions for active and inactive populations.

**Background.** In recent years, technology-based interventions have become a prominent approach to increasing physical activity (PA) and reducing sedentary behaviour (SB) in adolescents. Evidence shows that text messages (SMS) can be an effective and acceptable tool for enhancing these behaviours. In-depth investigations exploring preferences, feasibility and effectiveness of SMS interventions without other components such as smartphone applications are scarce.

**Aim.** To provide a vital insight into participant preferences of a novel, theory-based SMS intervention, this study addressed the following: 1) Participant preferences for design and content, 2) Psychological and behavioural changes (additional quantitative activity data expected to be available by November) as well as experience of theoretical frameworks used, 3) participant perceptions of feasibility.

**Methods.** 25 pupils (mean age  $17 \pm 0.2$  years) from a local school were recruited and agreed to receive SMS for 3 weeks. They were informed by Theory of Planned Behaviour and Social Cognitive Theory and involved several behaviour change techniques. 24 participants took part in 4 gender-mixed focus group discussions (38-43 minutes). A semi-structured interview guide was used, with a second researcher facilitating the discussions. Focus groups were audio recorded and transcribed. Braun & Clarke's (2006) thematic analysis approach was used with two researchers performing dependability and credibility checks, including a critical friends strategy.

**Results.** Participants perceived the intervention to be feasible as opt-in was straightforward and parents were supportive of their participation. There was no consensus which SMS frequency or timing was preferred. For message content, both behavioural (e.g. providing) and educational messages were popular with our sample. There was also no clear preference for one theory framework and not all participants felt the SMS helped them change their PA or SB. Overall, participants mentioned personalisation of messages would be helpful and timing, frequency and content of messages should be designed depending on an individual's schedule, goals and PA levels.

**Conclusion.** This study provides researchers, practitioners and policy makers with crucial evidence to inform the development of more effective messaging-based interventions promoting healthy lifestyles in youth. SMS interventions appear to be feasible, and with personalisation, could support adolescents in increasing PA and reducing SB.

Analysis of quantitative effectiveness data is expected to be completed by November for presentation at SPARC should our abstract be considered.

6. DataFit: Preparing children and adolescents to use their personal health data to become healthier, data literate citizens

Presenting Author: Dr Stephanie Adams (Research Associate, University of Edinburgh)

Authors: Dr Stephanie Adams, Dr Samantha Fawkner, Prof Judy Robertson, Ms Chuchu Li, Mr David Bellini, Mrs Kate Farrell, Mr Tommy Lawson

This abstract reports on DataFit, a project which involves getting people (particularly young learners) moving more and sitting less throughout the school day.

**Aim:** DataFit aims to develop an innovative learning programme for schools that provides relevant lesson materials and activity devices, which are used to teach data literacy skills whilst simultaneously fostering more physically active lifestyles. DataFit is about empowering young people to identify user-driven solutions and opportunities to move more, and to become more educated about their personal health data by actively engaging with devices and the data these technologies collect. This abstract discusses findings from Stage 1 of this long-term, multidisciplinary project. The aim of Stage 1 was to explore device usability and experiences, and opportunities for physical activity (PA) & health monitoring within the school setting.

**Methods:** Nine S1 students (6 females, 3 males, ages 11-13 years) and their teacher from Newbattle Centre for Digital Excellence participated in an interactive co-creation workshop.

**Results/Findings:** Few students were aware of the wide-reaching health benefits of PA beyond weight maintenance and heart health, and perceptions of PA were largely limited to sport. Young learners suggested that most of their PA occurred out-with class and school time. However, they identified several opportunities to be more active throughout and between their classes, and they responded positively towards the opportunity to monitor and discuss their PA in school. Young learners (100%) reported using and owning at least one device, with exposure at home to other devices, such as Apple watch (100%) and Fitbit (70%). All participants (100%) were interested in understanding their 'step count' data. 'Heart rate' (80%), 'mood' (80%), 'nutrition' (80%) and 'sleep' (70%) were also areas of interest. Not all students understood that their devices might be tracking and using their health data (e.g., step count).

**Conclusion:** Students and their teachers have substantial exposure and access to a variety of PA devices, but literacy associated with PA and safely using devices may be poor. There are several opportunities throughout the school day where young learners see opportunities to be moving more, and students and teachers can be empowered to identify realistic opportunities for this whilst learning to use activity data safely and effectively.



## Poster Abstracts

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4	Systematic review of the effect of classroom-based interventions to reduce sedentary behaviour on school-aged children’s psychological and educational outcomes; protocol	Chuchu Li
5	Experience of standing desks in secondary school classrooms	Samantha Fawkner
6	The use of a novel Co-operative learning model to engage Primary school children in Physical Education lessons	Joe Cowley
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8	The evaluation of ActiveChat: A classroom-based physical activity and sedentary behaviour programme implemented in Scottish secondary schools	Lauren McMichan
9	The effect of sedentary behaviour on bone mineral density in older adults: A systematic review	Lauren McMichan
10	Keeping Active in Residential Elderly: Preliminary findings of feasibility and impact of a resistance training intervention, aimed at improving health and functional capacity of frail older adults in residential care	Bridgitte Swales
11	The contribution of dog walking to daily moderate to vigorous physical activity in dog owners aged $\geq 65$ who walk their dog regularly	Amy Hume
12	Evaluation of an Intergenerational Student Led 12 Week Strength and Balance Programme	Lisa Dods
13	What a pain in the ar...teries! Electrical stimulation in peripheral arterial disease: the state of the evidence	Sean Carroll
14	A scoping review of the relationship between running and mental health	Freya Oswald
15	A systematic review and thematic synthesis exploring how previous physical activity influences engagement with exercise-based cardiac rehabilitation	Sheona McHale
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17	Can c25k (couch to 5k) keep women running?	Linda Thomson

18	Designing a pathway from primary care to community-based jogging group: What are the opinions of primary care staff and patients?	Gozde Ozakinci
19	'To Help', 'To Encourage', 'To Motivate': Creating a social movement to engage whole communities in physical activity	Marc Harris
20	"One long walk for us. One giant stride for heart health": The heart health exercise group that went for a walk and ended up on the Moon	Duncan Galbraith
21	Co-produced strength & balance groups: an exercise in active listening	Jon Lurie
22	Stand Up for Health- a feasibility trial to reduce sedentary behaviour in contact centres	Divya Sivaramakrishnan Jillian Manner
23	A Realist Review of Workplace Walking Challenges	Mary Allison
24	Measuring the response to prompts to stand: an exploration of a pilot study of UK office workers	Catriona O'Dolan
25	An Integrative, Systematic Review Exploring the Reach, Effectiveness, Adoption, Implementation, and Maintenance of Interventions to Reduce Sedentary Behaviour in Office Workers	Bradley MacDonald
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## 1. Assessments of physical literacy in children: A series of systematic reviews

Presenting Author: Cara Shearer (PhD researcher, Liverpool John Moores University)

Authors: Cara Shearer, Hannah R. Goss, Professor Zoe R. Knowles, Dr Lynne M. Boddy, Elizabeth J. Durden-Myers, Dr Lawrence Fowweather

Assessing the physical literacy (PL) concept is essential to tracking progress, guiding best practice and informing national policies. Within Scotland the PL debate is ongoing, therefore sharing information regarding existing measurement tools that can be utilised in practice is a meaningful addition to the current conversation as assessment is crucial to the implementation of the concept nationally.

Aim: To systematically review the literature for assessment tools that are appropriate to measure physical literacy elements within children

Methods: A systematic review was conducted in accordance with PRISMA-P guidelines. Search terms were defined during workshops with physical literacy experts before the following electronic databases were searched (12 May 2017- 10 January 2019) to identify relevant peer-reviewed journal articles published in English: (i) MEDLINE, (ii) ScienceDirect, (iii) SPORTDiscus, (iv) Education Research Complete, (v) Scopus and (vi) PsycINFO. Two independent reviewers screened studies for inclusion and extracted data. Methodological quality of quantitative and qualitative assessment tools was appraised using COSMIN and National Institute for Health and Care Excellence checklists, respectively. The feasibility and alignment of each tool to the physical literacy concept was assessed using a bespoke checklist.

Results: The initial search produced 7533 results, with 42 assessments included in the final review (cognitive n=3, affective n=17, physical n=22). CAPL -2 was the only tool included that assesses each element within the physical literacy concept, however, each tool within the review assesses at least one sub-element of physical literacy i.e. balance. There was a considerable lack of qualitative tools available in the literature. Psychometric properties generally reported well included content validity, reliability and internal consistency; there was a significant lack of criterion validity, hypothesis, measurement error and responsiveness testing. The majority of tools would be acceptable for use within a primary school setting; however, teachers would find it challenging to administer and interpret the results.

Conclusion: This work will inform the development of a holistic physical literacy assessment tool for use in both research and practice, which will contribute to the advancement of knowledge and empirical research surrounding the physical literacy concept.

PROSPERO REF: CRD42017061010 CRD42017062217

Key words: measurement, children, physical education, physical, affective, cognitive

2. “Part of the problem is that adults underestimate what a kid knows”: Stakeholder perceptions across Scotland, England and Wales of assessment practices in physical education and physical literacy

Presenting Author: Cara Shearer (PhD researcher, Liverpool John Moores University)

Within Scotland the conversation surrounding physical literacy (PL) is still ongoing, therefore it is essential to be fully explore assessment practices that may contribute to the implementation of the concept nationally. This abstract provides an insightful investigation of key stakeholders perceptions of PL assessment which aims to inform the development of a rigorous, authentic, and feasible assessment tool.

Aim: To explore key stakeholders (academics/practitioners, teachers, and children) views of current practice, future directions and effective implementation of physical literacy assessment within the primary school setting

Methods: Purposive samples of children aged 5-7 years (7 focus groups, n=36) and 7-11 years (10 focus groups, n=57), primary school teachers (6 focus groups, n=23) and experts in physical literacy (3 groups, academics n=13, practitioners n=8) across Scotland, England and Wales were recruited to take part in a series of concurrent focus groups. A semi structured focus group guide was developed focusing on acceptability, demand and implementation of physical literacy assessment within the physical education context. Focus groups were audio recorded, transcribed verbatim and analysed in an inductive and deductive manner. Key themes were organized into pen profiles representing common suggestions, recommendations and experiences of physical literacy assessment.

Findings: Stakeholders viewed the assessment of physical literacy as important but it was not considered a priority in many schools, resulting in variable practice. Notably, no assessments of the affective and cognitive domains of physical literacy were reported. Child responses reported a desire for enjoyment/fun within the assessment experience, while teachers recommended that assessments should be time efficient, simple and useful and physical literacy experts advocated the use of longitudinal assessment strategies. Self-assessment was suggested by all three groups as a potential approach to assessment, with the stakeholder and teacher groups valuing self-reflection as a crucial element of this.

Conclusion: This is the first study to explore stakeholder perceptions of a physical literacy assessment within primary school children.

### 3. Evaluating the Provision of Yoga for Children with Additional Support Needs

Presenting Author: Niamh Hart (Research Assistant, University of Edinburgh, Physical Activity for Health Research Centre)

Authors: Niamh Hart, Dr Josie Booth, Heini Lopponen, Caroline Phipps-Urch, David Bellini & Dr. Samantha Fawkner

The implementation of yoga within schools, particularly for children with additional support needs will create a low resource, supportive environment for the children to receive bespoke physical activity resources aimed at positively impacting emotional regulation and cognitive and attention functioning, as well as reducing anxiety and stress encouraging competence and confidence at an early age, and to stay active.

Aim - The aim of this study was to assess the feasibility of delivering and evaluating an 8 week yoga programme targeted at children with additional support for learning needs.

Methods - 21 pupils from P1 to P7 (mean age of 112 ( $\pm$ 28) months) participated in the yoga for children with additional support for learning needs, consent for whom was granted for 11 of the children. At baseline and post intervention the pupil's teachers answered a BRIEF 2 questionnaire and Strengths and Difficulties questionnaire (SDQ) and parents answered a BRIEF 2 questionnaire and optional feedback questionnaire. Observation of the pupil's engagement of yoga elements was conducted at baseline, mid-way and at the final week of the yoga intervention. Pupils completed a visual feelings scale immediately before and after each session. In addition, an interview with the yoga teacher and focus group with the pupil's support assistants (PSA) were carried out to determine levels of engagement, feasibility and acceptability. 30 minute bespoke yoga classes were delivered in groups of 3 or 4. The yoga sessions incorporated five elements including sound, breathing exercises, yoga poses, sensory activities and relaxation.

Results/Findings - Objective assessment suggested that pupils engaged with all elements of the yoga sessions, but there was greatest engagement with the sensory elements. Positive engagement with the yoga sessions was supported by reflections with the pupil support assistants, and also from the parent reports. Pre-post measures of the BRIEF 2 and SDQ identified no significant changes to scores and effect sizes were identified as negligible or small. Pupils feeling scale indicated that the children felt significantly happier after, compared with before, the yoga session. PSAs suggested that yoga in schools was feasible and beneficial for the children.

Conclusion - It was feasible to implement yoga for children with additional support for learning needs into main stream school curriculum, and was well received by both children, teachers and parents.

4. Systematic review of the effect of classroom-based interventions to reduce sedentary behaviour on school-aged children's psychological and educational outcomes; protocol

Presenting Author: Chuchu Li (PhD student, University of Edinburgh, Physical Activity for Health Research Centre)

Authors: Chuchu Li, Josie Booth; Samantha Fawcner; Eva Alejandra Coral Almeida; Jack Martin

Class hours contribute greatly to children's total sedentary time, therefore, classroom-based interventions play an important role in reducing children's sedentary behaviour and encouraging children to be more active. This systematic review will help society better understand the educational and psychological outcomes of sedentary prevention interventions and help to promote such interventions among school-aged children.

Background: There is substantial evidence showing that children spend too much time being sedentary, which has a negative effect on their physical and mental health. The typical classroom is inherently sedentary with compulsory seated lessons. Classroom-based interventions aim to reduce children's sedentary behaviour and while existing reviews have summarized the influence on children's health, the effect on educational and psychological outcomes have rarely been discussed.

Purpose: To summarize and classify classroom-based intervention strategies to reduce children's sedentary behaviour and assess their effects on objectively measured educational and psychological outcomes.

Method: A systematic search of electronic databases (Ovid MEDLINE, PsycINFO, ERIC, Embase, CINAHL, ASSIA, Web of Science, SPORTDiscus) was performed. Quantitative studies that investigated the influence of classroom-based interventions to reduce sedentary behaviour on school-aged children's cognitive ability, academic performance, and classroom behaviour were included. One reviewer screened 14280 titles and abstracts. A second reviewer screened 10% for reliability with acceptable levels of reliability. The retrieved 287 full texts will all be screened by two researchers independently. Data on the outcomes will be extracted by the first reviewer and checked by a second reviewer. The "Quality Assessment Tool for Quantitative Studies" will be used to assess the quality and risk of bias of the included studies.

Findings: A narrative synthesis is planned to summarize the effects of included interventions on cognition abilities, academic performance, and classroom behaviour. A meta-analysis will be conducted if the included studies are sufficiently homogenous. Subgroup comparisons will be made for different types of intervention and outcomes if applicable. Also, group difference on age, gender, school stage and duration of intervention will also be considered.

Conclusion: Findings from this systematic review will explain whether and to what extent classroom-based interventions to reduce sedentary behaviour have an effect on school-aged children's psychological and educational outcomes. These findings could help society better understand these interventions and their influence and inform future interventions to reduce sedentary behaviour among school-aged children.

## 5. Experience of standing desks in secondary school classrooms

Presenting Author: Dr Samantha Fawkner (Senior Lecturer Physical Activity and Health, University of Edinburgh, Physical Activity for Health Research Centre)

Authors: Samantha Fawkner, Xiaoyan Wang, Zhen Song, Amanda Pitkethy, Josie Booth

This study explores the engagement of pupils and teachers with standing desks in school, and some of the possible benefits. Standing desks are a potential strategy to address high levels of sedentary behaviour during school hours and to encourage young learners to adopt positive behaviour choices. It contributes to the outcomes of reducing sedentary behaviour and a less sedentary infrastructure.

**Aim.** The aim of this pilot study was to examine pupil and teacher experience of providing pupils autonomous use of standing desks in secondary school classrooms.

**Methods.** Two classrooms in a secondary school were provided mobile standing desks (4 or 5 desks at the back of the classroom) for 4 weeks. The classes were traditionally taught with pupils seated, and all pupils taught in the classroom were given autonomy over timing of desk use. Pupils who used the standing desks were asked to complete a short user survey after each use which included duration of use, a Likert feeling scale, and a free text entry ascertaining opinions of the desk. To further explore user experience, pupils were asked to complete a questionnaire during week 4 of the intervention and teacher (n=2) interviews and a pupil (n=4) focus group were conducted.

**Results.** Pupils (n=73) used the desks for M = 29.81 (SD = 22.06) minutes with a small but positive correlation between duration of use and positive user experience (r=0.33, P<0.05). Of those that completed the questionnaire (n=94), 59% used the standing desk at some stage. As a result of using the desks these pupils noted a reduction in boredom (59%), restlessness (44%), joint pain (42%) fatigue (39%) and anxiety (41%). The main reason for using the desks was to reduce restlessness. Pupils provided mostly positive free text responses and focus groups suggested positive energy management with the desks. Teachers were equally positive about opportunities to stand in class, whilst noting challenges resulting from mobile desks.

**Conclusion.** If available, the majority of secondary school pupils will choose to use standing desks and the opportunity to stand is positively received by both teachers and pupils. Changing the learning environment in this way may help pupils to manage energy levels and deal with restlessness during class.



6. The use of a novel Co-operative learning model to engage Primary school children in Physical Education lessons

Presenting Author: Dr Joe Cowley (Lecturer in Physical Education, University of Stirling)

This abstract focuses on the development of physical literacy and fundamental movement skills at the Primary school age. It specifically looks at a particular pedagogical strategy to engage every young person in Physical Education lessons at a level to suit themselves, with the aim of building perceived competence and confidence for lifelong physical activity participation

Aim: The extant literature shows that disengagement in Physical Education (PE) has encouraged a move away from the traditional teaching approach so often seen in schools, towards the use of student centred pedagogical models such as Co-operative learning (1). This intervention aimed to evaluate the use of a cooperative learning model in primary schools based Physical education lessons with the view to increasing participation during a series of cross country running lessons using a model similar to 'Parkrun' (2).

Methods: A total of 41 students with ages ranging between 11 and 12 years (mean age  $11.3 \pm 0.5$ ) participated in the study. The main goal of the teaching intervention was to maximise learning participation in a broad general PE class involving athletics, namely cross country running as the main activity. The priority during this intervention was to deliver all lessons through the significant aspects of learning in PE (3), ensuring that there were clear explicit and implicit learning intentions and success criteria for all pupils. From the classes who participated in the intervention, five focus groups were formed as part of a class based health and wellbeing activity. Respondents were purposively sampled with respect to age, gender and area locality within an unnamed schools cluster group central Scotland.

Findings: Using thematic analysis (4), three main themes were generated from the data (Relation of learning to previous experience, autonomy of learning and the use of technology. Some students who were usually reluctant to take part in activities were positively enthused with the autonomy given to them. Those who initially did not take part in the cross country running as a 'performer' were willing to do so after trying out other roles in their learning team. Students commented on the fact that they were not racing against each other 'en masse' as happens in traditional cross country running making them feel less threatened, whilst they stated that it felt more 'individualised' making them much more likely to participate.

Conclusion: The move towards a co-operative, 'Parkrun' style model greatly improved pupils perceived competence and participation during cross country athletics lessons.

7. A Place Standard Tool for children and young people: addressing social and spatial justice in Scotland in order to promote physical activity and health and wellbeing

Presenting Authors: Cherie Morgan and Marguerite Hunter Blair (Play Scotland)

Access to environments which allow children and young people to socialise, play and exercise is essential to promote positive health and wellbeing outcomes. It is vital that policy/decision makers understand the impacts of decisions regarding these.

Children and Young People's Place Standard Tools will enable the understanding of how children perceive and access space, to support their physical activity needs.

Background: We know that how children and young people spend their time has changed significantly with a reduction in the time spent playing outdoors, a massive contraction in their independent mobility and a huge increase in screen-based entertainment. Challenges faced by children – poverty, disadvantage or disability discrimination – intersect with and are compound by inequality of opportunity in many areas including placemaking and place-based planning. The Place Standard Tool is Scottish Government's internationally renowned approach to engaging constructively in structured conversations with people around place. Yet, the needs of children and young people in these conversations cannot always be facilitated by a tool developed with adults in mind.

Aim: to develop Children and Young People Place Standard Tools

Methodology: Thirteen organisations known to Play Scotland, APiC, or Scottish Government as having used the Place Standard Tool with CYP were approached to participate in a telephone interview or online survey, and this evidence was analysed. Further to that engagement with diverse groups of children and young people was carried out in a four-stage process.

Results/Findings: We have the results of the effectiveness of the use of the original Place Standard Tool with groups and are still engaging with children and young people to inform how to best engage with them about place, and how they want their views to be heard. We are confident that by producing Place Standard Tools for Children and Young people we can ensure CYP voices will be effectively heard within planning and placemaking discussions and enhance the understanding of decision makers of children's access needs to enable physical activity and promote their health and wellbeing.

"Urban population growth has thrust urban planning to the forefront of global challenges. Cities Alive: Designing for urban childhoods argues that in responding to these challenges, the needs, experiences and views of children should once more be centre stage. The central question ... is what a sustainable, successful, healthy city looks like. The answer? It looks like a child-friendly city." (Tim Gill, Cities Alive: Designing for urban childhoods)

8. The evaluation of ActiveChat: A classroom-based physical activity and sedentary behaviour programme implemented in Scottish secondary schools

Presenting Author: Dr Lauren McMichan (Research Assistant in Physical Activity for Health, University of Strathclyde)

Authors: Dr Lauren McMichan, Dr Fiona Muirhead, Dr David A. Rowe, Dr Ann-Marie Gibson

This abstract contributes to the Active Scotland Outcomes Framework as it is an evaluation of a classroom-based programme which aimed to educate adolescents on the importance of physical activity and motivate them to become more active. The programme also encouraged adolescents to find their own solutions to being more active, thus enhancing autonomy and competence.

Background: Physical activity (PA) of Scottish adolescents is low, with 18% reportedly meeting the guidelines. The school environment can provide opportunities for pupils to be active. ActiveChat is a classroom-based, teacher delivered PA and sedentary behaviour (SB) programme designed to enhance motivation and positive attitudes towards PA, reduce SB, and integrate movement within the classroom. Few classroom-based programmes have been designed and implemented within the secondary school setting.

Aim: Evaluation of programmes is important to determine effectiveness, therefore the aim of this study was to evaluate ActiveChat through exploring teacher and pupils' perceptions of the programme and determine the level of fidelity.

Methods: Two teachers (1M, 1F; age range 35-64 years) and 17 pupils (9M, 8F; age range = 11-14 years) participated in semi-structured interviews and focus groups. Duration of interviews/focus groups were ~15-30 minutes. A concurrent deductive and inductive content analysis was used to identify overall themes. Fidelity was assessed through direct observation, whereby two researchers observed all ActiveChat classes.

Results/Findings: Overall themes identified in the interviews with the teachers were: positive overview of the ActiveChat programme; intended outcomes; negative views towards movement outside lesson tasks; perceived benefits of active learning; recommendations to improve the ActiveChat programme; and personal experience and perceptions. Overall themes identified in the pupil focus groups were: positive perceptions of the ActiveChat programme; negative aspects of the ActiveChat programme; recommendations to improve the ActiveChat programme; learning outcomes; and barriers to PA.

Good levels of fidelity were reported based on researchers' observations, with 63% of the programme being implemented as designed.

Conclusion: Results of this evaluative study suggested teachers and pupils were receptive to the ActiveChat programme and identified its ability to integrate within the Scottish education system – the Curriculum for Excellence. Key findings from the direct observation and the teacher interviews suggest that movement needs to be integrated as part of the lesson tasks, rather than isolated active breaks. These findings and the recommendations provided by both teachers and pupils will further develop the ActiveChat programme for future research and implementation.

9. The effect of sedentary behaviour on bone mineral density in older adults: A systematic review

Presenting Author: Dr Lauren McMichan (Research Assistant, University of Strathclyde)

Authors: Dr Lauren McMichan, Mr Michael Dick, Dr Alexandra Mavroei

This abstract contributes to the Active Scotland Outcomes Framework as it highlights the potential benefit of reducing sedentary behaviour on bone health in older adults, therefore emphasises the importance of being active.

Background: Older adults spend a large proportion of their waking hours in sedentary activities, with literature reporting a mean of 9.4 hours/day. The detrimental effects of sedentary behaviour (SB) on cardiovascular health and mortality have been well established, yet little is known regarding the relationship between SB and bone health (bone mineral density (BMD)) in older adults.

Aim: The aim of this review is to determine the effects of SB on BMD in older adults.

Methods: Five electronic databases were searched: Web of Science (Core Collection); PubMed; EMBASE; Sports Medicine and Education; and PsycInfo. Inclusion criteria for studies were 1) healthy older adults mean age  $\geq 65$  years, 2) measured SB, 3) measured BMD using dual-energy X-ray absorptiometry. Quality was assessed using National Institute of Health Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies. Outcome data from included studies were extracted and presented in an evidence table.

Results/Findings: Following the search of databases, 17,811 potential articles were screened. Five studies were included for review based on inclusion criteria (two based on the same population). All studies were observational design: three cross-sectional; two longitudinal. Two studies were rated good and three were rated fair using the quality assessment criteria. Studies varied in the areas of measurement of BMD; these included: femoral neck; lumbar spine; pelvis; legs; arms; total hip; whole body. Results were varied across the studies and differed based on gender. Three studies reported positive associations between SB and BMD at different sites for women, whilst two found the opposite effect (a significant negative association). For men, there was uniformity in results with all three studies that had male participants reporting negative associations between SB and femoral neck, pelvic, whole body and leg BMD.

Conclusion: Results suggest differences between men and women when it comes to the effect of SB on BMD, and overall results are varied. This is likely due to the varying anatomical sections examined for BMD, the different methods used to measure SB (self-report vs accelerometer), and the scarcity of published literature. More research is required to determine the relationship between SB and BMD in this population.

10. Keeping Active in Residential Elderly: Preliminary findings of feasibility and impact of a resistance training intervention, aimed at improving health and functional capacity of frail older adults in residential care

Presenting Author: Bridgitte Swales (PhD student, University of Birmingham and University of Stirling)

Authors: Bridgitte Swales, Paul Doody 1, Janet M. Lord 3,4, Anna C. Whittaker 1,2 (1 School of Sport, Exercise and Rehabilitation Sciences, University of Birmingham, Birmingham, United Kingdom 2 Faculty of Health Sciences and Sport, University of Stirling, Stirling, Scotland, United Kingdom 3 MRC-ARUK Centre for Musculoskeletal Ageing Research, Institute of Inflammation and Ageing, University of Birmingham, Birmingham, United Kingdom 4 NIHR Birmingham Biomedical Research Centre, University Hospital Birmingham, Birmingham, United Kingdom)

This study and further research may help inform practical initiatives for muscle strengthening activities for frail older adults and support Active Scotland's aim to encourage both life-long physical activity and enable the inactive to become more active by understanding and promoting physical activity in older age groups.

Background: Frailty is a common and clinically significant multi-dimensional syndrome associated with adverse health outcomes such as hospitalisation, disability and mortality among older adults. Exercise interventions have been shown to be a beneficial treatment for frail older adults. However, more high-quality studies are needed to assess the feasibility and impact of such interventions in frail geriatric populations in different settings, and with regard to multi-dimensional health and wellbeing.

Aims: This study assessed the feasibility and impact of a specially adapted resistance training intervention; aimed at improving the multi-dimensional health and functional capacity of frail geriatric care home residents.

Participants and Methods: Eleven older adults (aged >65 years) were randomised into the intervention or wait-list control group. The intervention was a 6-week resistance training protocol for 30 mins 3 times per week using specialised machines installed in the care home. Mixed methods were used to assess the feasibility and acceptability of the intervention and research measures, and conduct limited efficacy testing of the secondary outcomes. Feasibility was measured through adherence statistics, and focus groups with staff and interviews with participants. Intention to treat analyses examined the change pre- to post-intervention in key physiological, psychosocial, cognitive, and functional measures.

Results: six participants were randomised to the intervention group, one withdrew due to ill-health and five (83.3%) completed all 18 sessions bar one session for one participant resulting in 98.9% adherence across the group. Qualitative analysis is still ongoing. ANOVAs revealed that the intervention group relative to the control group improved their walking speed ( $p=0.04$ ), overall Fried Frailty score ( $p = 0.01$ ) and leg extensor strength ( $p=0.03$ ). Similar trends for positive effects were also identified for leg strength diagnostics (leg curl and extensor). Psychosocial variables (stress, depression, anxiety, social support), cognition, and Activities of Daily Living scores did not change in either group.

Conclusion: The initial findings support the feasibility and impact of a strength training intervention with high adherence and positive trends identified for frailty and physical function. Further research may help inform practical initiatives for muscle strengthening activities for frail older adults in alignment with the updated UK Physical Activity Guidelines.

11. The contribution of dog walking to daily moderate to vigorous physical activity in dog owners aged  $\geq 65$  who walk their dog regularly

Presenting Author: Amy Hume (Physiotherapist, Glasgow Caledonian University, Centre for Living)

Authors: Amy Hume, Calum Leask, Sarah Ellis, Malcolm Granat, Daniel Mills, Philippa Dall  
This abstract explores how dog walking as a regular planned component of physical activity within the daily life of older adults contributes to meeting physical activity guidelines. Such information can be useful for practitioners as a basis for conversations with older adults who own, or are able and wish to own, a dog about staying active throughout life.

Aim. Dog owners are more physically active compared with non-dog owners, but the relative contribution of dog walking to physical activity (PA), including moderate to vigorous physical activity (MVPA), is unknown.

Methods. Older adults wore an activPAL monitor and completed a self-report diary of outdoor walks (start time, end time, purpose), for three 7-day assessments across a year. The free-text purpose of each walk was coded as dog walking or other. Secondary data analysis was conducted on a subsample of dog owners who regularly walked their dog(s) (at least 6 (out of 7) days/assessment). Each continuous walking event from the activPAL was coded as a dog walk, other purpose, or not reported, based on the start and end times ( $\pm 5$  min) and purpose from the walking diary. The relative contribution of dog walking and other purpose walking to outcome measures of number of steps, time spent walking, and time spent in MVPA (walking events with cadence  $> 100$  steps/min) was compared using Mann-Whitney U tests.

Results. Participants ( $n=13$ ; 62% female; aged  $69 \pm 4$  years) spent significantly more time in MVPA (median [interquartile range] 29 [16,38] vs. 10 [7,20] min/day;  $p=0.02$ ), walking (40 [34,51] vs. 17 [14,18] min/day;  $p=0.03$ ) and took more steps (4581 [4029,5222] vs. 2755 [1595,3217] steps/day;  $p=0.02$ ), when walking the dog compared to other outdoor walking. Self-reported diary walks covered 75% of total MVPA, but only 26% of total time walking. The remaining time was either walking in the home (not covered by the diary), or missing data (no diary entry).

Conclusions. For regular older adult dog walkers, most (56%) of their MVPA was accrued during dog walking. This confirms, using objectively measured MVPA, that dog walking is responsible for increased PA in dog owners compared to non-dog owners. Future work should explore whether this is also true in less-regular dog walkers, especially as dog walking may be more consistently recorded in the diary than other walks.

## 12. Evaluation of an Intergenerational Student Led 12 Week Strength and Balance Programme

Presenting Author: Lisa Dods (Sport and Fitness Lecturer/Physical Activity and Health Masters Student, Perth College UHI/University of Edinburgh)

The study contributes to the Active Scotland Outcomes Framework as it encourages inactive older adults to become more active throughout their life. It supports well-being and brings communities together in a mutually beneficial inter-generational project.

Background: It has been well documented that the number of older adults in Scotland is increasing. In care homes older adults can spend 80-90% of their day sitting or lying down, and organisations are looking for innovative ways to increase physical activity levels and improve strength and balance for residents. Projects are classed as Intergenerational if there is at least 20 years between the participants and if they are mutually beneficial. This may be a way to increase activity in a new context, though more research is required.

Aim: The purpose of the study was to establish if an intergenerational student led 12 week strength, balance and games physical activity programme, would improve functional fitness test results for older adults, living in a care home.

Methods: Residents were recruited and 2 x 60 minute sessions were delivered each week by students. Functional fitness tests were carried out pre, mid and post intervention: 30 second chair sit to stand; handgrip strength; one legged stance balance; and seated sit and reach. Evaluation questionnaires were completed by residents, students and staff.

Results: Residents n=13 were recruited into the study, of which n=10 completed the programme (mean age = 91.4, standard deviation = 5.08) and 10 students (mean age = 21.3, standard deviation = 2.72). Test results showed improvements in sit to stand and balance tests, but not flexibility or handgrip strength. Questionnaire results showed all participants liked the programme and helped identify future improvements.

Conclusions: A 12 week programme led by students significantly improved residents sit to stand and balance results, but did not significantly improve handgrip strength or flexibility results. The Intergenerational programme was well received and should be considered for future studies to increase strength and balance.



### 13. What a pain in the arteries! Electrical stimulation in peripheral arterial disease: the state of the evidence

Presenting Author: Sean Carroll (PhD candidate & Physiotherapist, Glasgow Caledonian University & NHS)

Authors: Sean Paul Carroll, Dr Ukachukwu Okoroafor Abaraogu, Dr Stuart R. Gray, Dr Leslie Wood & Dr Chris Seenan

This study contributes to the framework as it examines the state of the evidence in the use of electrical stimulation as an adjunct in PAD. With increased PAD prevalence in the elderly, and an aging population with low levels of PA, ES may reduce the main barriers of limb pain and limited walking capacity to increase exercise uptake and adherence.

Introduction: Peripheral Arterial Disease (PAD) is a common, non-communicable disease which manifests clinically as limb pain and reduced exercise intolerance, termed intermittent claudication (IC). Patients with PAD and IC have impaired quality of life due to reduced physical capacity and 3-4 times increased mortality compared to age and sex matched controls. Improving daily physical activity (PA) is important in individuals with IC as lower PA levels have been recognised as a strong predictor of increased morbidity and mortality in this population. Limb pain is a major barrier to exercise uptake and there are currently no effective treatments which can improve exercise tolerance in these patients. Recent work has suggested that the use of electrical stimulation applied to the lower limb during walking resulted in an increase in walking distance. However, the nature of the pain experience of IC, the mechanisms that contribute to the development of IC pain, and the mechanisms of the observed effects of electrical stimulation are yet to be established.

Methods: A scoping review will be conducted to address the following research questions: (1) what types of electrical stimulation modalities and interventions have been evaluated for benefit in PAD? (2) Which outcomes have been evaluated in electrical stimulation interventions in PAD? (3) Identify the study design and risk of bias for electrical stimulation modalities and interventions in PAD (4) Identify the current gaps in the literature and suggest future research priorities related to electrical stimulation for PAD. The framework developed by Arksey and O'Malley will be followed. The completed review will be reported in line with the preferred reporting items for Systematic Reviews and Meta-Analysis extension for Scoping Reviews.

Results: The results will be displayed according to the research question they address. This programme of research is in the process of finishing data collection and the preliminary results will be presented.

## 14. A scoping review of the relationship between running and mental health

Presenting Author: Freya Oswald (Medical Student, University of Edinburgh, Physical Activity for Health Research Centre)

Authors: Freya Oswald, Paul Kelly, Chloë Williamson and Jennifer Campbell

The findings of this scoping review are predicted to support increased well-being and resilience within communities as a result of running. In addition, public exposure and knowledge of our findings may encourage inactive members of the public to become more active to benefit from the psychological changes that result from running.

Introduction: It is widely accepted that physical activity is positively associated with physical health. However, poor mental health also contributes significantly to the global health burden. There is a substantial evidence base to support the relationship between physical activity and various mental health outcomes. The psychological changes that occur with physical activity (such as walking) and various mental health outcomes, such as depression, anxiety and self-efficacy. While the evidence base for the benefits of running on physical health is well-established, the psychological changes that occur as a result of running remain unclear. To the best of the authors' knowledge, no overview of the effect of running on mental health and well-being has been published.

Aim

- 1) Deliver an overview of the relationship between running and mental-health outcomes, particularly preventing mental ill-being and promoting mental well-being.
- 2) Highlight current evidence gaps and research priorities.

Methods

Design: Scoping review

Data sources: Ovid (Medline), Ovid (Embase), ProQuest and SportDiscus. Searches were conducted in August 2019.

Screening and reporting: From database searches, 16,399 papers were identified and screened by a team of researchers. Included full texts will be analysed and reported.

Results: Initial database searches identified 16,399 studies. At time of abstract submission, these studies are being screened by a team of researchers for inclusion in this scoping review. It is predicted that 30-50 studies will be included. Full results will be presented at the conference.

Conclusions: This review is the first attempt to comprehensively map what is known about the relationship between running and mental health. The results of this scoping review may have implications for researchers, practitioners, policy makers and other organisations. Knowledge gaps identified in this review will provide guidance for future research in this area. Findings regarding evidence of relationship between running and mental health may inform practice of healthcare workers and psychologists who advise on the benefits of running on mental health outcomes. In addition, this study may provide key evidence for organisations such as the Scottish Association for Mental Health, Jog Scotland, Parkrun, as well as guide government policies and public health messaging around running for mental health.

15. A systematic review and thematic synthesis exploring how previous physical activity influences engagement with exercise-based cardiac rehabilitation

Presenting Author: Sheona McHale (Postgraduate research student, Edinburgh Napier University, Cardiovascular Health Theme, School of Health and Social Care)

Authors: S. McHale, F Astin 2, L Neubeck 1, S Dawkes 1, C Hanson 1, 1. Edinburgh Napier University, 2. University of Huddersfield

This study contributes to the Active Scotland Outcomes Framework by increasing understanding of the factors influencing uptake and adherence to cardiac rehabilitation. This study will specifically inform the development of future exercise-based cardiac rehabilitation interventions for people with varying levels of physical activity.

Background: Exercise-based cardiac rehabilitation (EBCR) improves quality of life and reduces the risk of hospital readmission for individuals with acute coronary syndrome. However, half of eligible individuals choose not to participate and the reasons are not sufficiently clear. One reason may be that individuals consider themselves sufficiently active. Indeed, of all who are eligible for EBCR 40% report already meeting World Health Organisation physical activity guidelines. More detail is needed about how previous activity levels influence the decision to participate in or decline EBCR.

Aim: We aimed to systematically examine and synthesise qualitative evidence on perceptions of previous activity and to explore its relationship with participation in EBCR.

Methods: We conducted a systematic review and thematic synthesis of primary qualitative research published between 1990 and 2017. We searched the MEDLINE, CINAHL, PsycINFO and Embase databases.

Results: We identified 486 studies and included 12 in the review. Included studies involved 388 participants from six countries. We identified three main influences on engagement in EBCR; a perceived exercise identity, communication of EBCR services by healthcare professionals, and experience of EBCR. Exercise identity included exercise motivators, exercise self-confidence, exercise self-reliance, fitness identity and perception of disease severity. These influenced the perceived need for EBCR. Non-engagers perceived EBCR would be age or intensity inappropriate (too old or young, too easy or hard). Advice given post-event was instrumental in forming these perceptions.

Experiences of, and advice given during, EBCR reinforced perceptions about appropriateness. Dropouts considered themselves too old or young and/or the exercise sessions too easy or hard. Positive engagement resulted in improved knowledge of appropriate exercise levels and the benefits of cardiac rehabilitation for secondary prevention, improvements in fitness and social support for physical activity.

Conclusion: For individuals with acute coronary syndrome, we identified three main influences on engagement; a perceived exercise identity, communication of EBCR services by healthcare professionals, and experience of EBCR. To improve uptake and adherence, communication and practice should focus on tailoring advice to take account of previous activity levels, improving knowledge about appropriate activity intensity and emphasising the benefits of physical activity for secondary prevention.

## 16. Mapping the delivery of community-based physical activity public mental health interventions in Redcar and Cleveland: emerging promising practice

Presenting Author: Dr Fiona Duncan (Postdoctoral Research Associate, Durham University)

Authors: Fiona Duncan, Mike McGrath, Emily Oliver, David Osborn

This study increases our knowledge of community-based physical activity and sport mental health and wellbeing interventions that are currently being delivered in a selected area of North East England. The findings will inform the development of future physical activity and sport public mental health interventions for delivery in comparable areas of Scotland which will support wellbeing and resilience in communities.

Background: Public Mental Health (PMH) is a Scottish priority and a challenge for public health practitioners globally. However, strengthening the evidence base regarding community level physical activity and sport interventions to help prevent mental health problems from arising and to promote positive mental health is a priority for practitioners.

Aims: 1) to identify the types of community-based physical activity interventions employed in a purposively selected diverse geographical area of North-east England (Redcar and Cleveland) to improve public mental health outcomes for adults and 2) to determine the model, target population, content and known outcomes of each intervention.

Methods: Community-based interventions were identified through (i) desk-based data capture from standardised searches of publicly-available information (e.g. policy, strategy, intervention advertising), (ii) through established professional networks and services contacts (e.g. local authority suicide prevention coordinator, managers of third sector organisations) and (iii) by chain-referral sampling of individuals involved in local PMH promotion.

Results/Findings: Preliminary findings indicate that physical activity and sport are incorporated into a range of public mental health interventions for adults across Redcar and Cleveland. These include both universal interventions and those targeted at at-risk groups (i.e. carers, the unemployed, those with housing and/or debt issues). For example, Middlesbrough Football Club Foundation facilitate weekly football sessions and tournaments as part of a wider programme that aims to support local unemployed people, a Nordic beach walking group is one service of many that Redcar and Cleveland MIND offer their service users and A-team build, an activity group for unemployed men, incorporate rural walks and cycling into a varied activity programme. There is evidence of partnership working across local authorities, third sector and the NHS to deliver these interventions. Data collection is still ongoing.

Conclusion: There are currently several public mental health interventions with a physical activity or sport element embedded in Redcar and Cleveland. These interventions may facilitate non-active adults who are looking for support for a mental health issue to become more active and therefore be a route to communicate knowledge of the benefits of physical activity to harder-to-reach sections of society.

## 17. Can c25k (couch to 5k) keep women running?

Presenting Author: Linda Thomson (EdD Student, University of Edinburgh, Physical Activity for Health Research Centre)

Authors: Linda Thomson, Professor Nanette Mutrie, Dr Ailsa Niven

There are many examples of good research informing and guiding successful interventions to increase PA uptake. However, it can be argued that uptake is not enough. Interventions supporting maintenance are equally important for improving health. There is an urgency to increase understanding of c25k as an intervention leading to the maintenance of PA among women.

Background: While uptake and maintenance of PA have considerable recognised health benefits, participation remains low and maintenance of participation is problematic. It can be argued that women are recognised as an important population on which to focus because their PA levels are consistently lower than those of men. c25k is an intervention that has a successful track history of recruiting women and has the potential to be an important public health intervention with considerable reach. To date, limited research on this intervention has been conducted, specifically, what factors may encourage women who join c25k to continue to be physically active beyond the initial ten-week programme. To this end, research is required to determine which behaviour change techniques (BCTs) affect which behaviour change maintenance mediators and vice versa (Murray et al, 2017). Alongside understanding this relationship, there is a need for further research to focus on which BCTs, i.e., the success ingredients of interventions, influence which mediators of behaviour change. Murray highlights the importance of understanding how these BCTs are thought to influence mediators of behaviour change maintenance.

Aim: The overall aim of the project in focus is to increase understanding of these relationships and the potential of C25K to provide an intervention that will lead to the maintenance of increased PA.

Methods: This aim is being addressed through two specific questions: 1) Does C25K include behaviour change techniques that may lead to long-term behaviour change? 2) What are women's experiences of C25K, and what factors are influential on the journey to successful maintenance of PA (or not).

A case study approach is being developed to take the work forward. This consists of a detailed investigation, with data collected over a period of time, on women's experiences of c25k within a real-life context. A mapping exercise will be used to the jogscotland c25k type programme, the intermediate programme (jsc25k) to all potential BCTs based on the 93 BCTs of Michie's Behaviour Taxonomy (Michie et al 2013). A longitudinal design has been selected to gather participants' experience as it evolves through time from the beginning of the c25k until post 6 months intervention.

18. Designing a pathway from primary care to community-based jogging group: What are the opinions of primary care staff and patients?

Presenting Author: Dr Gozde Ozakinci (Senior Lecturer, University of St Andrews, School of Medicine)

Authors: Gozde Ozakinci, Sharon A Carstairs, Rayna H Rogowsky, Kathryn B Cunningham, Ian Shield, Malcolm McTavish, Allen Marr, George Findlay, Jo Stevens, Frank Sullivan

This project aims to create partnership between primary care and community-based physical activity, jogscotland, which is well-established across Scotland and used by a wide range of people for physical and mental health benefits. Enabling an effective method of connecting patients to jogscotland groups provides a unique opportunity to increase physical activity levels for patients in Fife and potentially across Scotland.

Background: The NICE guideline on exercise referral schemes suggests that referral to activities based outside of the gym may be linked to increased attendance. We aim to design and pilot a process of signposting patients attending primary care to community-based jogscotland groups and to examine barriers and facilitators of such a pathway for health professionals and patients.

Design: One-to-one interviews were conducted and analysed using applied thematic analysis. Informed by findings from the interviews, signposting pathway(s) to jogscotland will be designed and piloted around how community-based programmes can acceptably be introduced through primary care consultations.

Methods: We recruited GP/nurses and primary care registered patients with no physical health barriers to engage in physical activity (from 20 practices across Fife) aiming to achieve saturation of themes.

Results: 28 interviews have been conducted (n= 14 health professionals and n=14 patients). Synthesis of interview analysis highlights the option for both passive and active modes of signposting: verbal and written signposting, link worker/hub/champion, and opportunities to meet-and-greet buddy system with local group volunteers.

Conclusions: This project provides a unique opportunity to develop a partnership between primary care and community-based physical activity groups, signposting patients to a structured and volunteer-led physical activity programme in their community. Given these factors, this example of social prescribing has the strong potential of being successful in promoting behaviour change and achieving positive health outcomes for patients.

## 19. 'To Help', 'To Encourage', 'To Motivate': Creating a social movement to engage whole communities in physical activity

Presenting Author: Marc Harris (Research and Evidence Lead, Intelligent Health)

This abstract draws upon a wealth of data demonstrating the factors enabling substantial portions of 5 different Scottish communities to take part in a physical activity program. These findings can help improve the delivery, up-scaling and outcomes of new and existing programs and approaches aimed at increasing levels of activity throughout the Scottish population.

**Aim:** In 2019, 5 communities in Scotland have implemented a mass participation physical activity intervention, called "Beat the Street". Beat the Street turns a town or city into a game where residents register their walking and cycling journeys by tapping a smartcard on RFID readers called 'Beat Boxes' placed on lampposts at half-mile intervals throughout the local area. Players compete to see which schools, community groups and individuals can tap the most boxes, or achieve the most points throughout the 6-week game phase.

**Method:** Prior to each programme, participants are encouraged to register their smartcard online, during this process participants complete a questionnaire which includes a validated physical activity measure. Follow-up surveys are distributed immediately following the game and six months later. Pre-intervention/post-intervention comparisons are completed based on survey responses and in-depth analysis is completed based on data from each player's activity by tapping their smartcard on beat boxes.

**Results:** As of mid-2019, 73,010 people had taken part in 7 programmes delivered in Scotland since 2016 with 17,703 people taking part in 2019 alone. Complete data on physical activity and active travel at both registration and post-game was available for 678 participants in 2019 and these data indicate that on average, there has been a 10% decrease in levels of inactivity, which corresponds to 47% of inactive participants being lifted into activity. Further, there has been a 10% uplift in participants achieving 150+ minutes of activity per week and an 8% increase in participants opting for active modes of travel on 5 or more days per week. Qualitative data collected from participants post-game helps elucidate the motivations underpinning the level of engagement and behaviour change through this program with players reporting that the game creates a social movement, enhances level of community cohesion, connects individuals to their local environment and enables role modelling.

**Conclusion:** These findings indicate that Beat the Street can play a significant role in addressing the stubborn levels of inactivity in Scotland. Furthermore, the rich qualitative data generated provides novel insight which can help improve the delivery and up-scaling of community-wide and individual-level interventions.

20. “One long walk for us. One giant stride for heart health”: The heart health exercise group that went for a walk and ended up on the Moon

Presenting Author: Duncan Galbraith (Volunteer, Inverclyde Globetrotters)

The Inverclyde Globetrotters, whose members have all been referred by the NHS through the Live Active Exercise Referral Scheme for health reasons, are an unlikely example of what a small group, comprising mostly of older adults in their 70s and 80s, can achieve through technology to help people become and stay active.

Background: The Inverclyde Globetrotters were formed in February 2008 from a Phase IV cardiac rehabilitation class at Inverclyde Leisure’s Waterfront Gym, Greenock, when, armed with only a map and some pedometers, they set off to try to walk virtually round the world to promote the benefits of cardiac rehabilitation.

Aim: The aim was to encourage members to stay active between classes and accrue the health benefits that come from more walking and less sitting.

Methods: A simple A4 record sheet was used to record the steps walked during the past week and the distances walked, cycled and rowed during the hour-long weekly gym class.

Results/Findings: In May 2010, after 117 weeks ‘on the road’, the Inverclyde Globetrotters arrived back in Greenock having clocked up 30,688 miles. They kept walking. On 14 May 2019, the members, mostly in their 70s and 80s, ‘landed softly’ on the Moon to complete a 240,000-mile mission lasting 11 years, 3 months and 10 days. They clocked up their miles walking virtually across every continent, “visiting’ over 100 countries worldwide. Their efforts inspired the creation of World Walking, a free website/app developed to motivate people to walk more, whose users, from Australia to Wales, have recorded over 10 million miles (24 billion steps).

World Walking led to the development of:

The online Active Staff walking challenges of NHS Greater Glasgow & Clyde; Big Team Challenge ([bigteamchallenge.com](http://bigteamchallenge.com)) for online walking/cycling challenges; and Critter Quest, a fun interactive game for the Royal Hospital for Children at the Queen Elizabeth University Hospital Glasgow that rewards physical activity specific to each child.

Along the way, the Inverclyde Globetrotters launched and successfully completed:

A ‘Lunar Trek’ with Chest Heart & Stroke Scotland in 2012;

A world-wide online ‘Heart & Sole Challenge’ with Chest Heart & Stroke Scotland in 2015;

The ‘Inverclyde Million Miles Challenge’ with Inverclyde Health & Social Care Partnership and CVS Inverclyde in 2016-17; and

A ‘Billion Steps for Health Challenge’ in 2018; and

A ‘Watt’s Walking Wonders’ initiative in 2019 with Inverclyde Council to celebrate the bicentennial of James Watt

Conclusion: With a sense of fun and adventure a small group of people with long-term health conditions can help get the world walking.



## 21. Co-produced strength & balance groups: an exercise in active listening

Presenting Author: Jon Lurie (Development Officer, Sport Aberdeen)

Authors: Jon Lurie, Janet Thompson, Andrinne Craig, Jackie Thomson, Morag Rickard

Through co-production (NHS OT and Sport Aberdeen) and listening to participants feedback a Carers Exercise group was formed to encourage and enable the carer and the person being cared for to continue exercising in the community post NHS falls class. Within the community a pathway has been created to encourage progression resulting in the participants increasing self-management.

Aim:

- Co production between service users and service providers to establish a follow on exercise group in the community.
- Integrated services enabling NHS staff (AHP) to work with a third sector partner to deliver a service.
- Listen and respond to service users, empowering them to make decisions about their services.
- Supported self management by teaching backward chaining, providing information about local services and raising awareness of support networks

Methods:

- Gathering feedback from participants post falls group, participants felt they wouldn't "fit" in to mainstream classes. Janet Thompson Senior OT approached Sport Aberdeen to seek the possibility of creating a follow-on group for carers and the people they care for in the community enabling exercise benefits and new friendships to continue.
- Through collaborative working the group was formed with 1 class initially, through the groups success this has progressed to 2 classes with a 3rd currently in the planning stage to allow participants to progress from level 1-3. Through the group participants have since had the confidence to join new activities in the mainstream Sport Aberdeen programme.
- Local services including Bon Accord Care and Volunteer Support Aberdeen (VSA) have visited the sessions raising awareness of support networks.

Results/Findings/Conclusion:

- A culture of coproduction has evolved across service users and staff.
- Service users have progressed from strength and balance exercises to other activities, including Techno Gym.
- The same Outcome Measures are used to monitor improvement in strength and balance throughout the AHP led group and the Sport Aberdeen led group, demonstrating a continued improvement in strength, balance and confidence.
- The same AHP Staff provide support to the Sport Aberdeen group, providing continuity for service users.
- Sport Aberdeen staff visit the AHP group before the group transitions in to the community class to meet the participants and answer any questions the participants may have.
- This group now has permanent funding, thus securing its future.

## 22. Stand Up for Health- a feasibility trial to reduce sedentary behaviour in contact centres

Presenting Author: Dr Divya Sivaramakrishnan and Jillian Manner (Research assistants, University of Edinburgh, Scottish Collaboration for Public Health Research and Policy (SCPHRP))

Authors: Divya Sivaramakrishnan, Jillian Manner, Ruth Jepson, Graham Baker, Richard Parker, Andrew Stoddart, Scott Lloyd

This study contributes to the Active Scotland Outcomes Framework because it will allow us to better understand how to reduce sedentary behaviour in the context of contact centres, and understand the feasibility of our theory-based intervention, which will inform a larger trial and the development of future interventions to reduce sedentary behaviour in workplace settings.

Background: Sedentary behaviour has been linked to reduced mental and physical health, as well as lower job satisfaction and productivity. Contact centres have been identified as workplaces with high levels of sedentary behaviour, and it is reported that one in four members of staff regularly experience musculoskeletal problems. Stand Up for Health (SUH) is a workplace intervention developed to target sedentary behaviour in contact centres. The NIHR funded study has the following aims-

Aim 1: To test the acceptability and feasibility of implementing the Stand Up for Health intervention in contact centres

Aim 2: To assess the feasibility of using a cluster randomised controlled trial study design

Aim 3: To scope the feasibility of a future health economic evaluation of Stand Up for Health

Method: This multi-centre feasibility study employs a cluster randomised stepped wedge design, and will test out methods of collecting data on outcomes, as well as preliminary estimates of effectiveness. The primary outcome is sedentary time in workplace, objectively measured using activPALs. Secondary measures include total sedentary behaviour, physical activity, mental wellbeing, work engagement and musculoskeletal health. A process evaluation will be conducted using quantitative and qualitative methods to understand views and experiences of the SUH intervention activities, and implementation processes with a view to refining the theories of change.

Results: 11 contact centres from across the UK have been recruited and randomised. Intervention delivery has commenced in 3 centres consisting of the following elements:

(i) Workshops were conducted at each centre to introduce equipment and activities, and also served as a forum to elicit staff preferences and suggestions to reduce sedentary behaviour.

(ii) The SUH project team worked with each contact centre to develop an action plan and theory of action, to create change at organisational, environmental, group and individual levels.

Data collection runs from September 2019 to September 2020.

Conclusion: Contact centres present a complex work and research environment given the lack of autonomy among employees, shift patterns, and environmental and infrastructural constraints. This study will provide learnings on the implementation and acceptability of the SUH programme, and aid future implementation at a larger scale.

## 23. A Realist Review of Workplace Walking Challenges

Presenting Author: Mary Allison (PhD Student, University of Edinburgh, Physical Activity for Health Research Centre)

Authors: Mary Allison, Prof Ruth Jepson, Dr Ailsa Niven

The findings of the review illustrate how workplace walking programmes can deliver outcomes for both active and inactive employees. The study contains key messages and guidance for employers and others interested in delivering walking through and in work.

Background: Although there is a growing evidence base for the effectiveness of workplace physical activity interventions there are still limited conclusions about how workplace walking interventions work best for whom, in what context and why. The purpose of this review was to offer new insights into how workplace walking programmes, that use team-based step-count challenges, might work. We also intended to illustrate the value of the realist review approach.

Methods: Consistent with realist approaches, this review tested theories that were developed in a previous study of the Step Count Challenge (a specific Scottish workplace walking intervention). Our review search strategy used a previous Cochrane Study of Workplace Pedometer Interventions as its starting point. We then made three major adaptations to this approach: removed study design criteria, added theory based search terms and added a google scholar search. We adopted the published standards for both the conduct and the publication of realist reviews.

Results: Our search strategy identified 636 potentially relevant citations. These texts were then screened by reading in full and 58 citations included data that was rich enough to offer further explanatory insights into whether and how our theories might work. The review highlights the importance of: workplace culture, leadership and collective efficacy; the value of personal goal-led approaches to those motivated to recover previous health; the use of natural spaces to restore well-being when emotionally or cognitively overloaded; the value of team-based approaches to increase fun as well as accountability and finally, the role of competition and peer pressure being both positive and negative forces for short and longer-term behaviour change.

Conclusion: The review found our initial programme theories were valid and provided additional data for further theory refinement. We were also able to understand more about the role of our theories at different time points in workplace walking programmes, as well as understanding better the level at which they operated (culture, workplaces, teams and employees). The review also demonstrates that workplace walking interventions are complex and successful design requires a broad and deep theory-led approach. The realist approach was found to offer insights to support this.

## 24. Measuring the response to prompts to stand: an exploration of a pilot study of UK office workers

Presenting Author: Dr Catriona O'Dolan (Trial Manager, Glasgow Caledonian University)

Authors: Catriona O'Dolan, Philippa Dall, Margaret Grant, Maggie Lawrence

This abstract explores how sedentary office workers actually respond to prompts to stand up delivered via Microsoft outlook. Measuring whether people used the prompts directly (stood up straight away) or indirectly (reinforcing previous education) can inform future development of workplace interventions to encourage and enable inactive office workers to be more active at work.

**Aim.** Prompts to stand have been used in interventions to reduce sedentary behaviour (SB). Previous evaluation considered total SB, but it is unclear how individuals actually use prompts (direct cue to stand/diffuse reminder), or how prompts interact with usual behaviour. Understanding this would inform use as a behaviour change technique in evidence-based interventions.

**Methods.** Secondary analysis of a pilot RCT in UK office workers (age 29-58; 43% men), prompts + education (n=14) versus education (n=14). Participants wore an activPAL3 for 7 days at: baseline; early intervention (weeks 2-4); late intervention (weeks 8-10); follow-up (week 22). The prompts group received 1 prompt/hour at work (random time; at least 30min apart; weeks 1-10). Prompts were pre-generated, delivered using Microsoft Outlook, not linked to actual SB or presence at desk. Response to prompts was assessed (prompts group, early & late intervention) by comparing time of prompt to the next standing event (activPAL). To explore how prompts might interact with usual behaviour (both groups, baseline & follow-up) a set of virtual prompts was applied to analysis.

**Results.** During the intervention, prompts group participants were sitting for 5 prompts/day (mean [range] 69% [13%-93%] of all prompts). When seated, the mean time to stand after a prompt was 28min [7-126min]; participants stood within 1min of 10% [0-40%] and within 10min of 45% [18-77%] of prompts. During baseline/follow-up, all participants were sitting for 70% [33-95%] of virtual prompts. When seated, the mean time to stand after a virtual prompt was 34 minutes [6-84min]; participants stood within 1 min of 7% [0-32%] and within 10min of 38% [15-81%] of virtual prompts.

**Conclusions.** Most prompts were received when seated, indicating potential to directly change behaviour. However, intervention group response times suggest most prompts were not used as a direct cue and behaviour was indistinguishable from analysis of virtual prompt data.

## 25. An Integrative, Systematic Review Exploring the Reach, Effectiveness, Adoption, Implementation, and Maintenance of Interventions to Reduce Sedentary Behaviour in Office Workers

Presenting Author: Bradley MacDonald (PhD Student, University of Strathclyde, Physical Activity for Health)

Authors: Bradley MacDonald, Xanne Janssen, Alison Kirk, Mhairi Patience and Ann-Marie Gibson

Encouraging and enabling the countries sedentary office workers to be more active, and to reduce/break up sitting time, will only happen if interventions are implemented at scale. This review highlights that interventions may need to report across more indicators to facilitate informed decision making, and to identify the most efficient and effective interventions to scale-up.

Background: Previous systematic reviews of interventions targeting sedentary behaviour (SB) in office workers have focused reporting on indicators of efficacy. In this review, the RE-AIM (reach, effectiveness adoption, implementation and maintenance) framework was utilised to report on additional indicators that have the potential to inform, and improve, further implementation and translation of interventions targeting sedentary office workers.

Aim: The aim of the review was to gain an understanding of the proportion of RE-AIM indicators that are reported in the literature, to identify; whether gaps in reporting exist; which indicators are under-reported; and which existing methods may be useful in collecting data on under-reported indicators.

Methods: An integrative, systematic review approach was used to facilitate the inclusion of both qualitative and quantitative articles. Articles were included if they involved adult office workers, were conducted in an office setting, and changes in sedentary behaviour had been measured as a primary outcome. Five electronic databases were searched yielding 7234 articles, with 75 articles (61 individual interventions) meeting the inclusion criteria. The Covidence program was used to aid the blinded, double screening process, and analysis was conducted with a validated RE-AIM coding sheet across 28 indicators.

Results/findings: Reach indicators were the most frequently reported of the RE-AIM dimensions, which were reported on average 59% of the time. Efficacy/effectiveness were the second most reported dimension at 49% reporting across all of the indicators. Implementation indicators were reported an average of 44% of the time, with indicators of adoption and maintenance reported as the lowest at 13% and 8%, respectively.

Conclusions: The results of this review indicate that there is an imbalance in the reporting across indicators of the RE-AIM framework. Evaluating all interventions across RE-AIM indicators may be an essential first step in the effective translation of interventions as we move towards understanding intervention effectiveness under real-world conditions. Additionally, minimal reporting of indicators of adoption and maintenance fuels arguments that a more pragmatic “practice-based” approach to intervention design may be warranted. In light of the significant gaps in reporting, the research team have created specific recommendations to facilitate improved future reporting of office-based SB interventions.

## 26. A qualitative study exploring the impact of 20mph speed limits in Edinburgh on walking and cycling

Presenting Author: Kieran Turner (Research Assistant, University of Edinburgh, Physical Activity for Health Research Centre)

Authors: Kieran Turner, Lisa Schölin, Claire Cleland, Ruth Hunter, Ruth Jepson, Graham Baker

Twenty miles per hour speed limits are a transport policy action that may contribute to a more supportive environment for walking and cycling. Edinburgh is the first Scottish city to introduce a citywide network of such limits; this study looks to provide important insight into the mechanisms through which they may benefit opportunities for, and experiences of, walking and cycling.

**Background/aim:** Twenty miles per hour (20mph) speed limits are purported to increase walking and cycling, as lower traffic speeds are likely to create a more supportive environment for these travel modes. To date there has been little evidence to show if, and how, such speed limits influence these activities. In 2018, the City of Edinburgh Council implemented a citywide 20mph speed limit – the first Scottish city to do so. This study explored the potential mechanisms by which the 20mph limit in Edinburgh may influence walking and cycling.

**Methods:** Fourteen focus groups were conducted involving 96 individuals. Participants lived and/or worked in Edinburgh, and represented a range of socio-demographic and travel-related characteristics. Participants were recruited utilising pre-existing contacts, community councils, and survey participants. The topic guide was informed by a programme theory and investigated attitudes towards the speed limit, how the limit has influenced participants' personal walking and cycling experiences and behaviours, and their perceptions of others' walking and cycling. Qualitative data were analysed using NVivo 11. Key themes were developed using thematic analysis; those relating to walking and cycling are reported in this study.

**Results:** Views on how the 20mph speed limit had impacted walking and cycling were mixed. Participants identified a reduced speed differential between cyclists and motorists as an outcome of the speed limit. This was perceived positively – as it reduced conflict between the two groups, and negatively, as it meant bicycles spent more time in close proximity to passing or following cars. Parents discussed being more comfortable with their children walking and cycling on 20mph streets, as the impact of any potential collision would be lessened. An almost unanimous finding was the importance of segregated cycling infrastructure, and that without this in place the 20mph limit could only achieve limited impact on cycling behaviour. Car-free streets were identified as an action for encouraging active travel.

**Conclusion:** It is unlikely that substantial walking and cycling behaviour change will be achieved through implementing 20mph speed limits alone; they should be one several measures introduced to support walking and cycling, where separated active travel infrastructure is prioritised.

## 27. Disability Cycling: Identifying the barriers and facilitators to cycling for people with disabilities

Presenting Author: Findlay Thomson (Student, University of Edinburgh)

Authors: Findlay Thomson, Graham Baker

People with disabilities are a key group at risk of inequalities and are less likely to engage in physical activity than the general population. Adapted cycling is potentially a way to encourage and enable disabled people to become more active. This project highlights issues to address to promote participation for disabled people and to widen access to cycling.

**Aim:** Cycling is known to have numerous health and well-being benefits; however, few people with disabilities cycle and disability cycling remains an under-researched area. Therefore, the aim of this project was to explore the experience of disabled cyclists and the barriers and facilitators to cycling.

**Methods:** In this qualitative study, semi-structured interviews were conducted with 8 cyclists (3 males, 5 females; mean age  $50.6 \pm 8.2$  years) with a range of physical impairments. Participants were recruited through adapted cycling organisations and centres. Audio recordings of the interviews were transcribed verbatim and data were analysed using Braun and Clarke's thematic analysis.

**Findings:** Five themes were identified: 1) Experience of freedom and reduction in disability; 2) Additional issues hindering the ability and motivation to cycle; 3) Importance of an awareness of the requirements of disability cycling; 4) Frustration at inaccessible infrastructure; and 5) Contradicting efforts of organisations with power. Additional issues identified included high equipment costs and limited cycle route information. However, inclusive cycling centres and hubs are key facilitators as they understand the requirements of disability cycling and help provide solutions. Current efforts to make the built environment more accessible are often undermined by continued construction of new obstacles, such as stairs on cycle routes.

**Conclusion:** This study identified that adapted cycling has numerous benefits for disabled people such as providing enjoyment and freedom. However, for many the experience of cycling can often be frustrating and numerous barriers are evident. Many of these barriers are being addressed through inclusive cycling hubs. Further research should continue to investigate the experience of disabled cyclists to inform policy. Cycling provides a way which people with disabilities could increase their physical activity and efforts should be made to further widen access to cycling.

28. What cyclists tell us about what inspires them to cycle and transforms their cycling.  
Powerful stories of lived experience as role models and guidance for policy in Spokes  
Competition entries

Presenting Authors: Dr Miesbeth Knottenbelt (Volunteer, Spokes, The Lothian Cycle Campaign)

Authors: Miesbeth Knottenbelt, Dave du Feu

The Spokes competition entries were direct testimony of what encouraged a range of cyclists to take up cycling and what helped them to cycle more. There were stories of older and younger cyclists, parents talking about how they encouraged their kids to cycle, examples of positive impact on mental health, mention of important infrastructure enablers and more. In 2018 and 2019, Spokes (The Lothian Cycle Campaign) Summer Competitions asked cyclists about what transformed their cycling lives, and what inspired them to cycle. 80 cyclists representing a range of physical abilities, ethnic identity, gender, and different ages and life stages presented their stories. The questions were: 1. What brought the biggest positive transformation in your cycling life in the last year or two?, and 2. What inspired you (or others) to start getting about by bike? The competitions were open to anyone, were widely publicised on social media and cyclists' networks, and offered prizes to a dozen best entries. Self-sufficiency and the freedom that cycling affords was a big theme especially for disabled cyclists, and there were touching examples of the positive impact of cycling on mental health. Young parents told us what they do to enable their kids to cycle, older people wrote about e-bikes transforming their lives. Many stories identified important enablers (e.g. infrastructure, e-bikes, becoming a parent). It has been shown that stories and case studies are an effective medium for inspiring behaviour change, as they appeal to people's values and emotions (e.g. Common Cause, Scottish Government ISM model). The competition entries offer case studies from across the public which can serve as powerful role models. They supplement the material identified in the NICE Guidelines in that they provide material from a broad range of people. They also provide strong pointers to how new initiatives and developments are experienced by cyclists, and therefore to what helps and hinders cyclists. The competition entries generate new perspectives from cyclists themselves on what messages we need to get across for different types of people, and provides powerful material for getting these messages across to best effect.



## 29. The Inverclyde Bothy – Collaborative Active Travel and Place Based Partnership Project

Presenting Authors: Suzanne Forup and Donna Nicholas (Cycling UK)

Authors: Jenni Murray, Lorna McCartney, Josh Wood

The Bothy acts as a 'collaborative active travel fulcrum'. It works with a wide variety of local community groups (n=20+) to: enable delivery of existing activities (e.g. walking/cycling) and supports these groups to develop new activities to meet grass-root need enabling the inactive to be more active and building community resilience and wellbeing.

Background: Inverclyde Bothy is a unique partnership project run by Cycling UK; funded by a wide range of partners and supported by many key stakeholders. Established in 2018, the Bothy is strategically located within Gourock railway station; is easily accessible to both commuters and tourists; has bike storage and potential for e-charging points. The railway station itself is situated on the pierhead with access to two local passenger ferry services and is on numerous bus routes. The Bothy acts as a hub, coordinating and evaluating several work strands which contribute to the Active Scotland Outcomes Framework.

Aim: Supporting the Active Travel Vision and Community Empowerment, the Bothy enables and encourages community groups to develop activities to meet local need. Specifically, the Bothy is helping to coordinate 'Health Walks' (Paths for All) across the area and has rolled out a programme of 'Better Biking' (a bespoke cycling initiative to meet the specific needs of the interested group e.g. teaching New Scots families in the area to ride a bike; teaching preschool age children to ride a bike in a community setting; facilitating all-ability cycling etc.)

Methods: Outputs and outcomes pertain to behaviour change, community feedback, and health/wellbeing from a measured baseline. The evaluation framework for 2018/19 was multi-modal. It included: quantitative measures of outputs (number of walks/cycle rides/participants etc.); paper surveys with participants to capture baseline, 3-month and 6-month post-intervention data on levels of activity and personal goals etc.; qualitative interviews with participants, support staff, volunteers and staff to capture stories and changes witnessed; researcher observation; and third-party reflection.

Results: 2018/19 results available October 2019. To date, each project evaluates positively in terms of physical health, mental wellbeing and community building. Health Walks: 126 walkers registered; 3 walks per week. Cycling: 8-week all-ability programme facilitated c.30 participants weekly; 289 preschool children plus parents attended 'drop in' family sessions; c.30 New Scots learning to cycle.

Conclusion: Community-led, informed and delivered initiatives can encourage and enable the inactive to be more active and can help the active remain so throughout life. Grassroots PA initiatives which rely on volunteers can also build community resilience.

### 30. Cycling for All in Edinburgh - An impact evaluation of Cycling UK's All-ability Bike Centres (ABC)

Presenting Authors: Suzanne Forup and Donna Nicholas (Cycling UK)

Authors: Shona Black, David Glover

Cycling UK is passionate about supporting and empowering everyone, regardless of age, ability or condition to enjoy the benefits of cycling. The Edinburgh All-ability Bike Centres (ABC) focus on what people can do and provides cycling opportunities to a range of people with additional needs – many of whom were previously inactive – using a fleet of adaptive cycles.

Background: People with disabilities can have significant barriers to physical activity. The Scottish Health Survey (2012) states that only 26% of people with disabilities are physically active, compared to 44% of people without a disability. This impacts negatively on their health, wellbeing, inclusion and community integration. Cycling is however accessible to this demographic and the benefits are the same for everyone, regardless of ability or condition (Dattilo, 2015). The cycling world is adept at reconfiguring wheels, pedals and seats so that almost anyone can ride. However, these machines are only produced in small quantities, so they are expensive and can be hard to find. They can also be intimidating, awkward and confusing to use at first.

Aim: The ABC have available a wide range of adaptive bikes including side-by-sides, trikes, tandems, hand cycles and bicycles with space for a wheelchair user. The project provides drop-in sessions, so individuals, families and groups can trial the range of bikes on offer; and facilitate skills sessions to help riders develop their technique and confidence in a safe environment.

Methods: The evaluation framework in 2018/19 was multi-modal. It included: quantitative measures of outputs (participant numbers/conditions etc.); qualitative interviews with participants, ABC staff and volunteers; focus groups (with participants able to communicate effectively and with parents/carers/support workers); creative methods of evaluation e.g. 'Talking Mats' for those with communication difficulties; and researcher observation. A wide range of topics were covered, but results were analysed thematically to inform project outcomes.

Results 2018/19: The ABC has been enjoyed by 2,835 participants and 2,761 'plus ones' (family members/support workers). Participants range from 4-92 in age and have a wide range of additional needs (learning/physical disabilities; frailty; MS; Autism etc.). Outcomes reported include: weight-loss and increased mobility; cycling as "pure freedom" and an expression of "normality/being ordinary"; families, who might use a side-by-side or wheelchair bicycle, develop bonds and create memories; and longer rides help participants build self-esteem and independence.

Conclusion: Cycling is accessible to most - with the right adaptations and support. The ABC encourages and enables the inactive to become active and enhances mental wellbeing and community integration.

### 31. Getting Families in Edinburgh Cycling - an evaluation of the Play Together on Pedals (PTOP) programme

Presenting Authors: Suzanne Forup and Donna Nicholas (Cycling UK)

Authors Angie Kinghorn, Emily Ryder

Funded by Transport Scotland, PToP in Edinburgh is a collaborative programme designed by the partners – Cycling Scotland, Cycling UK and Play Scotland – to engage children and their families in cycling activities. Through a programme of community activities, preschool cycling, outreach and training, PToP aims to help all families feel that cycling is an option for them.

**Aims:** The focus of PToP is to support children and families to enjoy and gain confidence through cycling and to help address the recognised barriers to physical activity which are related to health inequalities and the impacts of multiple deprivation. In 2018/19, the partnership launched the project in Edinburgh. It is a wonderful example of co-production in which the voice of the local community shapes practice, and grassroots organisations are upskilled and supported with small grants to purchase equipment such as balance bikes and helmets for the benefit of those who live in the area. This paper will present an overview of the project, the lessons learned in 2018/19, and the results obtained – both outcomes (including those pertaining to health, wellbeing and child development) and outputs (monies distributed and practitioners trained).

**Methods:** The evaluation framework was multi-modal. It included: quantitative measures of outputs; paper surveys with parents/families to capture child development measures (linked to Curriculum for Excellence (CfE) e.g. balance; coordination; social skills); qualitative interviews with practitioners delivering the training and parents to capture their views on child development witnessed; researcher observation of children; and third-party reflection.

**Results 2018/19:** 31 nurseries/community organisation received funding for balance bikes. Teaching children to ride a bike is important in encouraging families to cycle for everyday journeys. To support this long-term objective, in 2018/19: 43 practitioners were trained to deliver PToP; 7 community organisations were funded to deliver PToP sessions; 25 nurseries and 3 playgroups were actively involved in PToP; 48 'drop-in' PToP sessions were held with 450+ preschool children and their families attending. A series of 'Bike Curious' Workshops to show parents/carers the range of options available for family cycling was also facilitated as were Sustrans-led family rides.

**Conclusions:** The programme evaluates well in terms of child development (CfE), improved physical health and making children happy; confidence building in parents who are signposted to adult cycle-skills classes; and awareness-raising about options for family cycling. Learning from 2018/19, 'drop-in' sessions will be held indoors winter 2019/20 to minimise the impact of bad weather; Autism-friendly and Older Sibling 'drop-in' sessions will also be facilitated.

## 32. WheelNess – Widening access to cycling in Inverness

Presenting Authors: Suzanne Forup and Donna Nicholas (Cycling UK)

Authors: Brendan Dougan, Fiona Johnston, Dr Katie Walter

WheelNess is an innovative project led by Cycling UK, funded by Transport Scotland, which gives free access to bikes and a tailored programme of support, to disadvantaged/vulnerable individuals in/around Inverness. It focuses on increasing health and mobility, addressing transport poverty and reducing isolation by targeting those living in the most disadvantaged areas and/or those living with long-term health conditions.

Introduction / Aim: Extensive research has shown that people who are most affected by societal inequalities related to factors such as low income, gender, social position, ethnic origin, geography, age and disability are more likely to have poorer physical and mental health than the general population (ScotPHO). WheelNess therefore works with this demographic and key stakeholders such as local GP practices; Highland Council; the University of the Highlands and Islands; local independent bike shops; and the third sector in an attempt to improve health and wellbeing outcomes for these individuals.

This paper will present an overview of year one of the project; the lessons learned; and the results obtained.

Method: The evaluation framework was multi-modal and included online/paper surveys; qualitative interviews, observation and third-party reflection.

Results: The WheelNess pilot has had a positive impact on many of the 157 participants who engaged in year one.

Positive outcomes in terms of: physical health; mental wellbeing; social inclusion; and financial gain have all been widely reported.

However, those living with more severe and enduring mental health conditions, learning disabilities, or in chaotic circumstances have not been able to access the project in its year one iteration.

Conclusion: Putting the learning from year one into practice, going forwards, the referral criteria will be refined and referrals will only be accepted from the following agencies (who can offer participants continuing, appropriate support):

- A Multiple Sclerosis (MS) Group – supported/linked by an MS OT/nurse
- A Cancer Recovery Group – supported by MacMillan
- Women supported by Women's Aid
- Parents at a local Primary School (in an area of multiple deprivation)
- Taxi drivers – supported by Cycle to Health (a Cycling project facilitated by Velocity Cafe and Bicycle Workshop - Inverness)

Furthermore, in response to an identified need, in year two, Cycling UK are developing the idea of a 'WheelNess All Ability Bike Centre' to support more people with additional needs to try cycling. This idea is being developed with partners in health and education.

### 33. Developing a physical activity programme for women with previous gestational diabetes using a secret Facebook group: a mixed-methods evaluation of the Moving Forward study

Presenting Author: Audrey Buelo (PhD Researcher, University of Edinburgh, Scottish Collaboration for Public Health Research and Policy)

Authors: Audrey Buelo, Professor Ruth Jepson, Dr Alison Kirk

This study contributes to the first outcome of the Active Scotland Outcomes Framework: Encouraging and enabling the inactive to be more active. In this piece of research, we worked with a low-activity group, women with young children with past diagnosis of gestational diabetes, to develop a physical activity programme that they found feasible, acceptable and sustainable.

Background: Focus groups for mothers with young children are typically poorly attended due to time constraints. A new method of consensus-gathering was needed to further understand physical inactivity and how to intervene in this group. A lay advisory group meeting resulted in the decision to hold a workshop over a secret Facebook group with participants to develop a theory of change and theory of action.

Aim: Test the feasibility using a secret Facebook group to host an intervention development workshop with women with past diagnosis of gestational diabetes.

Methods: The researchers created a secret Facebook group with content that sequentially progressed to develop a theory of change and action. We evaluated the feasibility and acceptability of the group by analysing Facebook analytics and a post-workshop survey. The researcher posted 1-2 times per day for 14 days. Messages and content were typically posted between 15:30 and 17:30 GMT, as suggested by the lay advisory group as mothers will be returning from work and may have a short break before dinnertime.

Results: Twenty-one participants took part. In total, 521 comments were provided in response to 18 posts of polls, video, text or photos (average = 28.9 comments per post). The total word count of participant comments was 21,142 words. The workshop was viewed positively, with 20 of 21 participants saying they liked the workshop somewhat or a great deal, and felt the group was a safe and open environment to share opinions. When asked if they would take part in something like this again, 15 of 21 said "Yes". Participants mentioned the format was convenient to fit into their day; it allowed them to reflect on their own experiences; and how they liked helping research progress. The six participants who didn't reply "yes" said it was still difficult finding time and it depended on what else was going on.

Conclusion: Using a secret Facebook group to develop a physical activity interventions proves to be a feasible and acceptable method. This holds significant potential for hard-to-reach groups who could benefit from this method of co-production.

34. The Scottish walking for Health Research Exchange (SHaRE): The development and preliminary evaluation of a research repository to enhance the impact of walking for health-related research on policy and practice

Presenting Author: Dr Ailsa Niven (Senior Lecturer Physical Activity for Health, University of Edinburgh, Physical Activity for Health Research Centre)

Authors: Ailsa Niven, Chloë Williamson, Divya Sivaramakrishnan, Rona Gibb

This abstract has the potential to contribute to all of the outcomes. This project aims to support the work of the whole Active Scotland Outcomes Framework by providing access to credible research that may support strategy and delivery for many groups in Scotland.

Background: Walking has been described as the 'nearest activity to perfect exercise', and Scotland was the first country to develop a National Walking Strategy to promote physical activity through walking. The strategy delivery plan recognises a need to 'develop and publicise walking related research findings' to support policy makers and practitioners in implementing the Walking Strategy.

Aim: The Scottish walking for Health Research Exchange (SHaRE) project aimed to create and evaluate the use and visibility of an online repository to facilitate access to up-to-date walking for health related research.

Method: In 2018 SHaRE was created, trialled, refined and launched using WordPress and is 'hosted' on the SPARC website. SHaRE has two main functions: a) for researchers/project workers to upload and share details of their work in a digestible format; b) for practitioners and policy makers to access this material to support their work. In undertaking a preliminary evaluation of SHaRE from the launch until September 2019 we i) carried out descriptive analysis of website use; ii) sought feedback from registered members, and iii) assessed SHaRE engagement through metrics from our twitter account.

Results: SHaRE is functioning well with minimal maintenance updates required. From conception to time of abstract submission, there have been 2682 total views of the SHaRE website. There are 103 registered users of SHaRE, 81 studies have been uploaded to the repository, and 517 searches have been executed. Although response rate to the evaluation survey was low (n=9), responses indicate SHaRE is easy to use and has potential to be a useful resource to disseminate and access research findings. SHaRE also has 126 followers on twitter, and SHaRE's weekly 'paper of the week' tweets have had up to 4,800 impressions and 120 engagements.

Conclusion: Preliminary evaluation shows SHaRE is a promising and solid resource with a growing audience. However, we firmly believe the potential of SHaRE has yet to be realised. Through ongoing support from Paths for All we will continue to build the resource and audience, and the next phase will focus on facilitating and evaluating policy maker and practitioner engagement.

35. How do we successfully implement effective interventions designed to reduce physical inactivity in Ireland? Key learnings from the Irish Physical Activity Research Collaboration

Presenting Author: Dr Joseph Murphy (Project Manager, University of Limerick, Physical Education and Sport Sciences)

Authors: Joseph Murphy, Benny Cullen, Sarah O'Brien, Marie Murphy, Niamh Murphy, Shirley O'Shea, Peter Smyth,, Vydehi Muppavara, Ronan Kielt, James Lavelle, Colette Brolly, Caolan Ward, Fiona Mansergh and Catherine Woods

The abstract contributes key learnings from the Irish context regarding the key question; "how do we successfully implement effective interventions designed to reduce physical inactivity".

The collaboration and tools mentioned in the abstract aim to encourage and enable people to be more active through all domains of life; recreation, transport, domestic and occupation.

Background: There are multiple interventions available for promoting physical activity (PA), which can be implemented in many different ways. Despite this, the efforts to promote PA in Ireland have been insufficient with low levels of children and adolescents (15.5%), adults (32.6%), and older adults (33%) achieving the recommended PA levels.

Aim: The Irish Physical Activity Research Collaboration (I-PARC) aims to find answers to the following question; "how do we successfully implement effective interventions designed to reduce physical inactivity in Ireland?"

Methods: I-PARC uses a mixed methods approach through partnership of research institutes, government departments and agencies across three work packages (WPs). WP1 seeks to establish a collaboration of key stakeholders in order to create the enabling context needed for PA promotion. WP2 involves the development of a standardised evaluation framework (SEF) for assessing PA interventions. This is made possible through feedback surveys, practitioner workshops and a two-stage consultation. WP3 combines survey and interview methods to understand implementation barriers and facilitators of PA interventions in Ireland.

Key Findings: To date, I-PARC has created a collaboration of key stakeholders involved with PA promotion across various sectors. This includes a project team, practitioner advisory panel, and research advisory group. Participation events, social media and an I-PARC website have been successful for the knowledge translation of the project aims, updates and outputs. Work on the SEF has led to key learnings around creating a tool that is both effective and usable in practice. Aspects such as outcomes generated, time burden associated, and the methods for implementing a SEF need to be taken into account and are essential for its success.

Conclusion: I-PARC highlights the need for effective partnerships and buy in from various sectors in order to promote PA. The project is proving successful for the development of an evaluation framework that is usable in practice and provides key information. Furthermore, gathering information from those involved in the delivery of PA interventions will provide valuable insight into the facilitators and barriers of implementation. Finally, the collaboration leads to the transfer of knowledge for all parties, reducing the gap between research, practice and policy.

### 36. Translating the 2011 UK CMOs Scientific Physical Activity Guidelines into Public Communication Messages

Presenting Author: Flora Jackson (Health Improvement Manager (Physical Activity) NHS Health Scotland)

Authors: Flora Jackson, Sharon Love and Dr Niamh Martin

This research translated the 2011 UK CMOs Physical Activity Guideline into meaningful public facing messages that were used to inform the development of public facing resources designed to enable delivery of the NHS National Physical Activity Pathway by encouraging and enabling the inactive to be more active.

In 2011 the first UK-wide physical activity guidelines were published by the four chief medical officers. The guidelines drew on latest international evidence. Although a series of factsheets were published alongside the guidelines. Neither the guidelines nor the factsheets were intended to be public-facing. Health professionals and other promoters of physical activity need to translate the guidelines into appropriate messages for each life stage in a way that is engaging, motivational and meaningful. In 2012, NHS Health Scotland commissioned research to inform the development of key themes for physical activity promotion across the life stages identified within the physical activity guidelines. This research aimed to identify what motivates people to be physically active in order to identify how best to communicate the messages in the guidelines in a way which will resonate with the public.

Method: A qualitative methodological approach was adopted. A number of focus groups and individual interviews were conducted in urban, semi-urban and rural locations across four different Scottish health boards. Participants were weighted towards the C2DE sector and included parents and carers, as well as people from each age stage including black and minority ethnic people, those with health conditions and those with reduced functional capacity.

Findings: Findings identified; the public's interpretation of the current guidelines; elements of the guidelines which resonated most with population groups; themes that would motivate population groups to take up the guidelines'; understanding from the public's perspective how best to explain the guidelines in simple, motivational and meaningful terms; professionals (health and social care or otherwise) the public would be most receptive to hearing messages from.

Conclusion: These findings were compiled into a learning note that presents a number of themes and key learning points that should be considered by professionals in the promotion of physical activity across all life stages and some life stage specific considerations. This information was used to inform the development of public facing messaging and materials accompanying the NHS National Physical Activity Pathway and can be used more broadly to help the development of communications and physical activity interventions, from brief advice through to programme development.



### 37. Investigating the use of a newly developed 6-minute walking app for adults with Type 2 diabetes

Presenting Author: William Hodgson (Student, University of Strathclyde, Sport and Physical Activity for Health)

Authors: William Hodgson, Dr Alison Kirk and Dr Liane Lewis

Type-2 diabetes is linked to inactivity. During 6-minute walk tests (6MWT), diabetics generally walk shorter distances than non-diabetics. A newly developed 6MWT app can provide diabetics and clinicians with a motivational tool to improve physical activity levels and fitness of patients. Such an intervention can help manage patients diabetes, reduce blood glucose levels and reduce the risk of further ill-health.

Background: Type-2 diabetes mellitus is a chronic non-communicable disease, which is linked to factors such as inactivity. Globally 352 million people are living with Type-2 diabetes and this number is increasing. The 6-minute walk test (6MWT) is commonly used to measure functional capacity (FC) of patients. During 6MWT's diabetic patients generally walk shorter distances than non-diabetics. Mobile technology can motivate individuals to change behaviour and be more active. A smartphone walking app designed to measure the 6MWT is being developed at the University of Strathclyde. This app has the potential to encourage inactive patients to be more active.

Aim: The aim of this project was to test the validity and reliability of the 6MWT app amongst adults with Type-2 diabetes.

Methods: Type-2 diabetics were recruited,  $n = 10$ , Mean  $\pm$  SD: Age =  $66 \pm 2.45$  years. Each participant completed one manual 6MWT as per recommended guidelines. Participants completed two further unsupervised 6MWT's at a location of their own choice using the 6MWT app. Reliability and validity of the 6MWT App was investigated using correlational statistical analysis.

Results/Findings: An Intraclass Correlation Coefficient revealed a significant good reliability between App 6MWT 1 and App 6MWT 2, ICC = .75, 95% CI = .264 - .931. Spearman's Rho found a non-significant, positive and moderate correlation between the manual 6MWT and App 6MWT 1,  $r_s = .41$ ,  $n=10$ ,  $p = .244$  (two-tailed). A Bland-Altman Plot displaying the level of agreement between the Manual 6MWT and App 6MWT 1 showed that the App 6MWT 1 overestimated the Manual 6MWT distance walked by 6%.

Conclusion: The newly developed 6MWT app was found to closely correlate with the manual 6MWT. Factors such as sample size, weather conditions, walking terrains, user-error and impact of GPS signal strength were identified as having a possible impact on results. These factors will be examined during further testing and development of the 6MWT app. A future qualitative study will be undertaken to explore the usability of the app with patients and clinicians. The App has the potential to become a useful tool to support physical activity in people with Type-2 diabetes.

38. Do framed mental health messages on social media influence university students' motivation for physical activity? A Randomised Control Trial

Presenting Author: Georgia Gilbert (Medical student, The University of Edinburgh)

Authors: Georgia Gilbert, Paul Kelly

This abstract aims to assess how messages which promote physical activity (PA) can be most effectively worded in order to inform, motivate and increase PA level. In doing so, we aim to use these messaging strategies to encourage and enable both inactive and active university students to improve and maintain their PA level.

Introduction/Aim: Message framing has been used as an effective strategy for promoting physical activity (PA) in university students. However, there is a lack of consensus with regard to whether gain-framed (GF), or loss-framed (LF) messages are more effective. Framed messaging regarding the mental health outcomes of PA, via social media delivery has never been assessed.

Methods: A Randomised Control Trial collected pre-post intervention online questionnaire responses to assess perceived knowledge, self-determination, motivation for PA, exercise, active travel and PA levels of UK university students, in response to a framed mental health messaging intervention on Facebook.

Results: Both GF and LF messages effectively increased perceived knowledge about mental health benefits of PA (GF  $p < 0.001$ , LF  $p < 0.001$ ), motivation for PA (GF  $p = 0.005$ , LF  $p = 0.01$ ), exercise (GF  $p = 0.001$ , LF  $p = 0.001$ ) and active travel (GF  $p = 0.008$ , LF  $p = 0.004$ ). Effect sizes ranged from medium to large. No GF or LF advantage was observed.

Conclusions Framed messages regarding mental health outcomes of PA via social media could be effective for PA promotion in universities when students are at a critical age for establishment of long-term PA behaviours.

### 39. Factors influencing physical activity counselling among medical professionals

Presenting Author: Emma Watkinson (Medical student, The University of Edinburgh)

Authors: Emma Watkinson, Samantha Fawcner

This study explored the role of doctors in promoting physical activity and trends in physical activity counselling practices. The aim was to identify subgroups of doctors where counselling is inadequate to try to understand the reasons they do or do not promote physical activity. This could indicate suitable intervention methods to improve counselling and thus reduce inactivity.

Aims: This study aimed to examine doctors' physical activity (PA) levels and counselling practices, and how this varies over a medical career and between general practice and hospital-based care.

Methods: Participants were recruited via word of mouth and social media. They completed an on-line survey with questions to identify PA levels, stage of career, type of care and counselling practices. Data were analysed using spearman's correlation and a chi-square test.

Results: 340 participants responded; 81 in primary care (GPs) and 185 in secondary or tertiary care (hospital based). 79.71 % of participants met the UK PA guidelines. Activity level did not vary across graduation year or career stage, neither was it associated with counselling practices. Junior doctors were more likely than seniors to rate PA counselling as important (OR=2.3), to discuss PA with more than half of their patients (OR=1.3) and more likely to use screening tools (OR=1.4). GPs were more likely than hospital doctors to rate PA counselling as important (OR=4.5), and more likely to use screening tools (OR=1.8). Hospital doctors were more likely than GPs to discuss PA with more than half of their patients (OR=1.4).

Conclusion: Doctors are active individuals who consider PA counselling an important part of their role. However, counselling levels in practice are low and very few doctors are using screening tools. Junior doctors are more involved in counselling than seniors. The evidence was conflicting, and whilst GPs are more likely to highly rate the importance of PA counselling, hospital doctors are more likely to actually discuss PA with their patients.

#### 40. Medical students' knowledge of physical activity guidelines after introducing physical activity education into the first year of training

Presenting Author: Emma Sharland (Student, University of Edinburgh)

Authors: Emma Sharland, Georgia Gilbert, Samantha Fawkner, Paul Kelly, Jake Adams, Scott Osborne, Jeni Harden, Danijela Gasevic

This study helps highlight the importance of physical activity education in a medical school curriculum as current students are not feeling adequately trained enough to deal with these issues. Through educating medical students on the correct guidelines for physical activity we are enabling them, as future medical professionals, to help encourage their patients to become more active and stay active.

**Aim:** Physical activity (PA) can be promoted by doctors and healthcare professionals through providing information about PA guidelines. This is a key starting point for providing support for patients who need to increase their PA and therefore it is critical that medical students are aware of the PA guidelines. However, our previous study demonstrated how few students were equipped with this knowledge when there was no timetabled PA education in the curriculum. This study therefore aimed to examine the effect of introducing PA education into the first year of training on undergraduate medical students' knowledge of the PA guidelines and their confidence in applying these in future clinical practice.

**Methods:** A prospective educational intervention study was carried out. In 2015 both the first- (C1) and second year (C2) students were surveyed regarding their knowledge of PA guidelines and their confidence in applying these. This survey was repeated in 2019 with the current first- (C3) and second-year (I2) cohorts. The second-year cohort had undergone a flipped classroom intervention which provided education about PA guidelines when they were in their first year of training. Chi squared was used to test differences between 1st years (groups C1 and C3, neither had received the intervention) and between 2nd years (C2 and I2, where I2 had received the intervention 6 months prior to being surveyed).

**Results/findings:** The percentage of 2nd year students who received the intervention (I2) who knew the moderate intensity adult guideline was significantly greater than C2 students (45% vs 12%,  $P < 0.001$ , Cramer's  $V = 0.368$ , very strong). There was no difference in knowledge between the 1st year students, which remained very low (C1=13%; C3=9%;  $P = 0.39$ ). Students who received the intervention also felt more adequately trained about PA, 20% compared to 9% ( $p = 0.018$ ), than those that did not receive it. There was little difference between comparison groups C1 and C3 (5% compared to 6%) and this was not statistically significant ( $P = 0.683$ ).

**Conclusion:** Delivery of a single flipped classroom session on PA guidelines and the benefits of PA resulted in students being more likely to know the PA guidelines, and in feeling more adequately trained.

#### 41. Community-based exercise prescription: modelling inequalities in engagement and completion using the National Referral Database

Presenting Author: Dr Emily Oliver (Associate Professor, Durham University, Department of Sport and Exercise Sciences)

Authors: Emily J. Oliver, Adetayo Kasim, Caroline Dodd-Reynolds, Dimitrios Vallis.

This research has relevance for enabling the inactive to become more active (ERS target inactive participants) and improving opportunities to participate. It is especially pertinent for the framework's commitment to equality. The insight offered has direct implications for ongoing reviews of social prescribing and how best to scale up and compare design and delivery of physical activity.

Background: Exercise referral schemes (ERS) effect positive health changes, however, there is notable variability in outcomes for participants. Physical activity programmes generally, and ERS specifically, have been criticised for failing to attract, retain, and benefit those who have greater barriers to engagement (e.g., poorer health, lower socioeconomic status). Previous explorations of inequalities have been limited by use of within-scheme data, and lack of contextual understanding of engagement. The study is the first independent analysis of the multi-scheme National Referral Database (NRD), exploring: (i) who does (and who does not) engage in and complete ERS, and (ii) whether the outcomes of participation are equivalent for population sub-groups.

Aim: This research used individual and scheme-level data from the National Referral Database, and local census data, to model engagement, completion, and outcomes of exercise referral schemes across socio-demographic groups.

Methods: Data from 23,782 individuals across 14 referral schemes was modelled using a multilevel Bayesian inference approach. Comparative posterior probabilities using scheme-level local demographics identified over-sampling in engagement. Dummy proxies were constructed for mental health referral pathways, WHO obesity classification (using BMI), and leisure time. Effectiveness was operationalised by post and change in METmins.

Results: Converging models showed that inequalities presented in a nuanced way. Across schemes, females and those over 36, with a higher index of multiple deprivation, or from an ethnic minority background were over-represented relative to local population demographics. Of those that participated, being female, older, and with more leisure time increased completion odds, whereas being from an ethnic minority background, unemployed, more obese, or entering via a mental health-related referral decreased completion odds. Greater positive changes in physical activity levels were experienced by younger, more deprived, and male participants.

Conclusion: While ERS engage populations at greater risk of inactivity and associated health problems, a range of complex barriers undermine successful participation. As a result, health inequalities may be exacerbated. Despite high variance from missing observed and unobserved characteristics, differences between schemes did emerge; follow-up work examining practices in high-performing schemes is ongoing. Findings have implications for how best to scale up and compare different practices of physical activity delivery.

## 42. Using Self Efficacy Theory to understand adherence to an Exercise Referral Scheme (ERS) in patients with coronary heart disease (CHD) - a Qualitative approach

Presenting Author: Lucy Marshall (Cardiac Research Nurse, Edinburgh University Centre for Cardiovascular Science)

Authors: Lucy Marshall, Ailsa Niven

This qualitative research contributes to the Active Scotland Outcomes Framework as it increases the understanding of the role of self-efficacy in encouraging and enabling individuals with coronary heart disease (CHD) to be more active. Additionally, the research offers insight into supporting well-being and resilience in this patient group. This consequently allows us to improve our strategy to encouraging these individuals to be more active.

Background: Despite the known benefits of physical activity, adherence to exercise referral schemes (ERS) remains poor. Factors influencing non-adherence are complex, particularly in patients with medical conditions such as coronary heart disease (CHD). Self-efficacy is a psychological construct which is part of the Social Cognitive Theory and refers to an individual's belief in their own capabilities to organise and accomplish a task or goal (Bandura, 1986). It is well known that Self-efficacy is predictive of both the implementation and the maintenance of physical activity however the determinants of self-efficacy for ERS are less well researched.

Aim: The aim of this qualitative research was to increase understanding of the determinants of self-efficacy in participants who adhere to ERS.

Methods: Participants with CHD who had adhered to the 'Fit for Health' ERS organised by Edinburgh Leisure (n=10) were interviewed to find out about their determinants of self-efficacy. Interviews were analysed using the Framework Method to identify emergent themes.

Results: It emerged that individuals who had previous exercise and cardiac rehabilitation experience had a sense of mastery experience. Guidance from the instructor and helping others was found to be linked to vicarious experience. Verbal persuasion was evident from the family and the instructor. Finally, anxiety about exercise and positive thoughts were linked to physiological and emotional state. Other themes arose that influenced self-efficacy but did not fit into the theory such as the group environment, social interaction and friendship and motivation. This highlights that one theoretical model may not always be sufficient to describe behaviour.

Conclusion: Bandura's theory on self-efficacy facilitated the understanding of what the key determinants of self-efficacy are for individuals with CHD, however motivation and the group environment were also of importance. The findings of this study may provide guidance for instructors to assist CHD patients in increasing self-efficacy and therefore adherence to ERS. Further larger scale research with a longer interview duration would be beneficial to confirm these results and to assist in future evidence-based practice.