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Using formative research with older adults to inform a community physical activity programme: Get Healthy, Get Active

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Abstract

Aim: The purpose of this formative study was to explore current knowledge and attitudes towards physical activity, as well as perceived barriers, facilitators and opportunities for physical activity participation among older adults living in the community. The findings have subsequently informed the design, delivery and recruitment strategies of a local community physical activity intervention programme which forms part of Sport England's national Get Healthy, Get Active initiative.

Background: There is a growing public health concern regarding the amount of time spent in sedentary and physical activity behaviours within the older adult population.

Methods: Between March and June 2016, 34 participants took part in one of six focus groups as part of a descriptive formative study. A homogenous purposive sample of 28 community dwelling white, British older adults (six male), aged 65-90 years (M=78, SD=7 years) participated in one of five focus group sessions. An additional convenience pragmatic sub-sample of six participants (three male), aged 65-90 years (M=75, SD=4 years), recruited from an assisted living retirement home participated in a sixth focus group. Questions for focus groups were structured around the PRECEDE stage of the PRECEDE-PROCEDE model of health programme design, implementation, and evaluation. Questions addressed knowledge, attitudes and beliefs towards physical activity, as well as views on barriers and opportunities for physical activity participation. All data were transcribed verbatim. Thematic analysis was then conducted with outcomes represented as pen profiles.

Findings: Consistent views regarding both the potential physical and psychosocial benefits of physical activity were noted regardless of living status. The themes of, opportunities and

awareness for physical activity participation, cost, transport, location and season/weather varied between participants living in an assisted living retirement home and community dwelling older adults. Further comparative research on the physical activity requirements of older adults living in assisted living versus community settings are warranted.

[Abstract word count: 300]

Keywords: Ageing; Focus Groups; Formative; Physical Activity; Community groups; Primary care

Introduction

In the United Kingdom (UK) there are over 11 million older adults aged 65 years and over who make up 18 per cent of the population (UK Office for National Statistics, 2017). Aligning with the United States (US) and other developed countries (United Nations, 2015) this proportion is projected to increase to at least 24 per cent by 2039 (UK Office for National Statistics, 2017). Although prolongation of life remains an important public health goal, of even greater significance is that extended life should involve preservation of the capacity to live independently, function well and quality of life (Rejeski et al., 2013). The purpose of this formative descriptive study was to explore current knowledge and attitudes towards physical activity (PA), as well as perceived barriers, facilitators and opportunities for PA participation among older adults living in the community. The findings were used to inform the design, delivery, and recruitment strategies of an ongoing three-year community PA intervention project, Get Healthy, Get Active (GHGA), which forms part of Sport England's national GHGA programme (Sport England, 2012).

Background

Guidelines issued by the UK Chief Medical Officers and the US Surgeon Generals recommend that older adults (≥65 years) engage in at least 150 minutes of moderate (or 75 minutes of vigorous) PA per week in bouts of at least 10 minutes, with muscle-strengthening and balance activities included on at least two of those days (Department of Health, 2011; Centers for Disease Control and Prevention (CDC), 2015). Despite the recognised evidence base for the benefits of regular PA (CDC, 2015; Reid and Foster, 2017; World Health Organization (WHO), 2017), objective summaries of PA levels among older adults show that only 15 per cent of males and 10% of females within the UK, and 9.5% of males and 7% of

females within the US meet the recommended PA guidelines (Tucker, Welk and Beyler, 2011; Jefferis et al., 2014). Given that current PA guidelines remain the same for both adults (18-64 years) and older adults (≥65 years), such high levels of inactivity suggests that PA guidelines appear too demanding for the latter population (Booth and Hawley, 2015).

Accumulating evidence suggests that prolonged and continuous bouts of sedentary behaviours (SB; defined as waking behaviours in a sitting, reclining or lying posture with energy expenditure ≤1.5 metabolic equivalents (Tremblay et al., 2017)) have similar physical (e.g., premature mortality, chronic diseases and all-cause dementia risk) and psychosocial (e.g., self-perceived quality of life, wellbeing and self-efficacy) risk factors to that of physical inactivity (Wilmot et al., 2012; Edwards and Loprinzi, 2016; Falck, Davis and Liu-Ambrose, 2016; Kim, Im and Choi, 2016). In fact, SB is now an identifiable risk factor independent of other PA behaviours (Tremblay et al., 2017). Spending on average 80% of their time in a seated posture, and with 67% being sedentary for more than eight and a half hours per day (Shaw et al., 2017), older adults are the most sedentary segment of society and seldom engage in moderate-to-vigorous PA (Chastin et al., 2017).

Several social (e.g., social awkwardness and peer/family support), behavioural (e.g., ageing stereotypes and lack of time), physical (e.g., improved balance and flexibility), and environmental (e.g., transport and neighbourhood safety) correlates of PA among older adults have been noted in recent formative (Schijndel- Speet et al., 2014; Banerjee et al., 2015) and qualitative research (Franco et al., 2015; Devereux-Fitzgerald et al., 2016; Phoenix and Tulle, 2017). Such findings are a first step in enabling policymakers and healthcare professionals to implement effective PA interventions and promote active ageing (Franco et al., 2015). Given the potential benefits associated with PA outlined, such interventions have the potential to

reduce, age-related morbidity and declines in activities of daily living, maintain muscle strength and mass, improve quality of life, and thus reduce the primary and total health care costs associated with SB and physical inactivity among this population (Bauman et al., 2016).

Prior research notes that interventions aimed at promoting PA participation should adopt an appropriate conceptual health promotion model to prioritise the key assets of the target group (Plotnikoff et al., 2014). The PRECEDE-PROCEED model of health programme design, implementation, and evaluation (Green and Kreuter, 2005) provides the target population with a comprehensive and structured assessment of their own needs and barriers to a healthy lifestyle. The PRECEDE component of the model comprises of, predisposing, enabling, and reinforcing factors has previously been used as a formative framework to guide PA intervention content and design (Mackintosh et al., 2011; Banerjee et al., 2015). This model has also been adopted as a method for the identification of perceived PA barriers and facilitators among older adults (Banerjee et al., 2015; Gagliardi et al., 2015) and other populations (Makintosh et al., 2011; Emdadi et al., 2015; Susan et al., 2017).

The purpose of this formative study was to (i) explore current knowledge and attitudes towards PA, as well as the perceived barriers, facilitators and opportunities for PA participation among older adults living in the community who had agreed to take part in an ongoing PA programme; and (ii) use this data to inform the design, delivery and recruitment strategies of an ongoing community PA intervention programme, as well as international PA interventions among this population. Given the purpose and aims outlined, the Evidence Integration Triangle (Glasgow, 2012) was adopted as the overarching theoretical framework. Through the prompt identification of success and failures across individual-focused and patient–provider interventions, as well as health systems and policy-level change initiatives,

the framework allows for the exploration of the three main evidence-based components of intervention program/policy, implementation processes, and measures of progress. Hence, this framework enabled a steep learning cycle through an initial 12-week pilot GHGA programme delivered by the Metropolitan Borough Council within the chosen local authority. Results and analysis from this pilot were fed back to Sport England as the funder, as well as deliverers and participants in order to assess, evaluate and promptly inform adapted future iterations of the GHGA programme.

Methods

Participants and procedures

A descriptive formative study was undertaken from March to June 2016. Participants were recruited from one local authority in North West England recognised as having the highest percentage of inactive older adults (80%) compared to the UK national average, and the highest national health costs associated with physical inactivity (Active People Survey, 2014; Sport England's Local Profile Tool, 2015). The first author facilitated six, mixed-gender focus groups. Representative of the uptake of participants within the target GHGA initiative, a homogenous purposive sample of 28 community dwelling white, British older adults (five male) participated in five of the focus groups, with an additional convenience pragmatic sub-sample of six participants (three male) recruited from an assisted living retirement home, participating in the sixth focus group. In total, 34 older adults (eight male), aged 65-90 years (M=78, SD=7 years), participated across the six sessions. Four focus groups involved a group size of six to ten participants, and two involved three participants (mean focus group size of 6 ± 5 participants). Previous focus groups in PA studies have been conducted effectively with as many as 12 (Moran et al., 2015), and as few as four (Schneider et al., 2016) participants. Focus groups took place in two church halls, an assisted living retirement home lounge, and a

theatre. All locations were free from background noise, and participants could be overlooked but not overheard. The inclusion criterion set out by Sport England as funders of the GHGA programme were that participants must be 65 years of age or over, reside within one local authority in North West England, could provide written informed consent to participate.

GHGA is an ongoing three-year project which seeks to increase the number of inactive older adults participating in PA at least once a week for 30 minutes, via a 12-week PA intervention delivered by the Metropolitan Borough Council within the assigned local authority. Participants due to participate in GHGA received a covering letter, participant information sheet, and consent form. Prior to the commencement of the study, institutional ethical approval was received (#SPA-REC-2015-329) and written informed consent was obtained for all participants prior to participation. All focus groups utilised the PRECEDE stage of the PRECEDE-PROCEDE model (Green and Kreuter, 2005) within their design allowing for the exploration of predisposing, enabling and reinforcing correlates of PA participation. To maximise the interaction between participants, focus group questions were reviewed by the project team for appropriateness of question ordering and flow. Subsequent minor additions were made to questions on social isolation and PA advertisement. The semi-structured discussion guide included open ended questions structured to prompt discussion with equal chance for participants to contribute (Stewart and Shamdasani, 2014). Focus groups were led by a trained facilitator and with an observer/ note taker also present. Questions addressed knowledge, attitudes and beliefs towards PA as well as views on barriers and opportunities for PA participation. An example question from a section exploring barriers to PA was: *"Can you tell me about what stops you from participating in physical activity?"* Questions therefore demonstrated aspects of face validity as they were transparent and relevant to both the topic and target population (French et al., 2015).

206

207 Data Coding and Analysis

208 Focus groups lasted between 20 and 45 minutes (M=29, SD=12), were audio recorded, and
209 later transcribed verbatim, resulting in 66 pages of raw transcription data with Arial font, size
210 12 and double-spaced. Verbatim transcripts were read and re-read to allow familiarisation of
211 the data and then imported into the QSR NVivo 11 software package (QSR International Pty
212 Ltd., Doncaster, Victoria, Australia, 2017).

213

214 Previous research within this population has adopted analytical procedures including thematic
215 analysis (Van Dyck et al., 2017), content analysis (Middelweerd et al., 2014) and used
216 specialist qualitative data analysis packages, such as NVivo (Warmoth et al., 2016). In
217 supporting new methodologies and data representation within qualitative research (Orr and
218 Phoenix, 2015), the current study followed the pen profiling protocol. The pen profile
219 approach has been used in recent child PA research (Mackintosh et al., 2011; Boddy et al.,
220 2012; Knowles et al., 2013; Noonan et al., 2016b) and presents findings from content
221 analysis via a diagram of composite key emerging themes. In summary, data were initially
222 analysed deductively via content analysis (Braun and Clarke, 2006), using the PRECEDE
223 component of the PRECEDE-PROCEED model (Green and Kreuter, 2005) as a thematic
224 framework which reflects the underlying study purpose. Inductive analysis then allowed for
225 emerging themes to be created beyond the pre-defined categories. Data were then organised
226 schematically to assist with interpretation of the themes (Aggio et al., 2016). As akin to more
227 traditional qualitative research, verbatim quotations were subsequently used to expand the
228 pen profiles, provide context, and verify participant responses. Previous studies have
229 demonstrated this method's applicability in representing analysis outcomes within PA

research (Mackintosh et al., 2011; Boddy et al., 2012; Knowles et al., 2013; Noonan et al., 2016a) making it accessible to researchers who have an affinity with both quantitative and qualitative backgrounds (Knowles et al., 2013; Noonan et al., 2016a). Recent findings suggest that the discrepancy between objective isolation and felt loneliness may be associated with undesirable health outcomes such as cognitive dysfunction.

Three pen profiles were developed to display themes within the data aligned to the PRECEDE component of the PRECEDE-PROCEED model (Green and Kreuter, 2005). Quotations were labelled by focus group number (Fn) and subsequent participant number (Pn) within that focus group. Characterising traits of this protocol include details of frequency counts and extracts of verbatim quotes to provide context to the themes. A minimum threshold for theme inclusion was based upon comparable participant numbers within previous research adopting a pen profiling approach (Boddy et al., 2012; Noonan et al., 2016a) and hence, was set as $\geq n = 6$, with n representing individual mentions per participant. However, multiple 'mentions' by the same participant were only counted once. Methodological rigour was demonstrated through a process of triangular consensus (Hawley-Hague et al., 2016) between the authors. This offered transparency, credibility, and trustworthiness of the results, as the data were critically reviewed using a reverse tracking process from pen profiles to verbatim transcripts, providing alternative interpretations of the data (Smith and Caddick, 2012). The process was repeated through cross verification and discussion until subsequent agreement on data themes in relation to verbatim extracts was reached (Aggio et al., 2016).

Findings and Discussion

Predisposing Correlates

Figure 1 displays the predisposing correlates of PA participation. In agreement with previous research (Gray et al., 2015; Kosteli, Williams and Cumming, 2016), the most highly cited theme of motivation (n=29) was perceived to be both a facilitator (n=15) and barrier (n=14) to PA participation throughout. Some participants were proactive in seeking out opportunities for PA.

I'm a lung cancer survivor and I just ran a mile last month and I raised £550. (Focus group (F) 1: Participant (P) 2)

Contrastingly, others expressed disinterest in PA altogether believing that they would not derive any health benefit.

*I've pushed these [*PA] classes to lots and lots of friends and they still ignore it, they will not come to anything like this. (F1: P3)

Participants also reported laziness or apathy to prevent participation.

*It's [*lack of PA] apathy, just a*pathy, people can't be bothered.* (F4: P3)

The importance of pre-intervention intrinsic motivation (e.g., participating for enjoyment) among older adults is key for both initial adoption and maintenance of PA participation (Gray et al., 2015). Hence, future interventions could promote intrinsic motivation for PA through the adoption of socioemotional selectivity theory (Carstensen, Isaacowitz and Charles, 1999).

Recent findings support this theory's notion that motivation for PA is more effectively promoted when paired with positive messages about the benefits of PA rather than with negative messages about the risks of inactivity (Notthoff et al., 2016).

The theme of age (n=20) was identified as a key barrier (n=13) to PA participation throughout.

They [older adults] get to a certain age and just give up. (F1: P7)

Social norms and cultural misconceptions often influence not only the type of PA in which older adults engage, but whether they participate at all (Greaney et al., 2016). Moreover, participants noted that lifestyle (n=20) often affects individual views regarding ageing stereotypes, and therefore PA participation. Some participants felt that physically active older adults were more likely to be habituated to PA engagement over many years.

*Well if you've ke*pt healthy, kept fit all your life, you can keep doing it. (F1: P4)

Conversely, it was felt that inactive older adults were reluctant to start exercising.

You see the *ones who haven't been doing it [PA]* are not going to be able to start and do it now. (F2: P1)

Previous research has also reported prior PA behaviours (e.g., being sedentary or active) to be key correlates affecting older adults' current PA participation levels (Franco et al., 2015). Additionally, ageing is associated with a decrease in the size of social networks and hence,

older adults are at increased risks of isolation (Devereux-Fitzgerald et al., 2016; Greaney et al., 2016). Corroborating with prior research (Greaney et al., 2016), participants throughout perceived isolation (n=15) to be a key barrier (n=14) to PA participation.

It's so easy to get trapped inside and not go out. People sit in front of the television from the moment they wake up to when they go to bed. (F6: P5)

Isolation is associated with decreased social and psychological wellbeing (Owen et al., 2010; Milligan et al., 2015) and increased SB among older adults (Nicholson, 2012). Certain targeted intervention strategies can reduce isolation by providing an opportunity for older adults from differing socio-economic areas to take part in PA within local community spaces (e.g., parks, leisure centres and churches), that promote social networking by encouraging camaraderie, adaptability, and productive engagement, without the pressure to perform (Milligan et al., 2015; Gardiner, Geldenhuys and Gott, 2016). Given that SB is an independent and modifiable behavioural target for interventions (Lewis et al., 2017), opportunities to replace SB with health-enhancing behaviours such as moderate-to-vigorous PA (Prince et al., 2014), light PA (McMahon et al., 2017; Phoenix and Tulle, 2017) and standing (Healy et al., 2015) should be promoted. However, none of the participants in the current study noted negative health effects of prolonged sitting, or the importance of breaks in sedentary time. Previous research has noted that older adults are not yet familiar with the concept of SB and hence, are not motivated to reduce such behaviours (Van Dyck et al., 2017). Hence, it is first crucial to increase knowledge about the negative health consequences of SB independent from PA among both older adults and other populations (Van Dyck et al., 2017).

Participants also emphasised the importance of having a wide range of choice and opportunities for PA (n=22), and in general their perceptions of community provision were positive (n=16).

Yes i*t's quite a good place [the local authority where the study took place]*. There are a lot of different physical activity sessions to try. (F2: P1)

However, in line with recent research (Baert et al., 2016; Träff, Cedersund and Nord, 2017), key barriers noted by the participants within the assisted living group included a lack of advertisement regarding PA opportunities, and few opportunities to take part in PA within the assisted living facility itself.

It's hard to know what is on if you don't read the noticeboards and to be honest most of us have even stopped looking at that [noticeboard] because there is never anything on it. (F3: P3)

Further research into the most effective advertisement strategies to engage older adults in assisted living facilities is warranted (Hildebrand and Neufeld, 2009). Regardless of living status, participants noted a strong preference not to engage with online and/or social media channels for advertising and awareness-raising.

*A lot of people our age don't like that tec*hnology stuff at all. I would not know where to start. (F5: P2)

These results suggest educational strategies outlining the potential benefits of technology in aiding PA participation are needed (Bird et al., 2015). This is especially salient given that recent research has shown technology-based interventions to have good adherence and provide a sustainable means of reducing SB and promoting PA participation among older adults (Garcia et al., 2016; Skjæret et al., 2016).

< Insert Figure 1 about here >

Enabling Correlates

Figure 2 displays the enabling correlates of PA participation. Consistent with previous research findings (Franco et al., 2015; Borodulin et al., 2016), cost (n=21) was perceived to be a key barrier (n=12) to PA participation exclusively among the community dwelling participants who were either unable, or unwilling to pay the perceived high costs associated with both attending and travelling to such programmes.

Money is the big bug bear [barrier to PA participation] *isn't it.* (F2: P5)

Examples of competing programmes were also noted, with free and lower cost programmes taking precedence over the more expensive.

We like it [a local chair-based PA programme] *because it's free*. (F4: P3)

Thus, to effectively increase PA participation within this population, health-promotion strategies should go further than merely educating and raising awareness about potential

health benefits, and should also advocate for the provision of low-cost, and easy reachable PA opportunities regardless of financial status (Petrescu-Prahova et al., 2015; Borodulin et al., 2016). It is worth noting that for the participants recruited from the assisted living retirement home, any PA sessions delivered were included within the cost of the overall living fee, and hence lack of financial resources was rejected as a potential barrier for PA participation (Baert et al., 2016).

Participants' views on the theme of location (n=11) centered on neighbourhood safety. Declining health and physical impairments associated with ageing increase the time spent in ones' neighbourhood and thus, neighbourhood environmental factors such as, PA provision, proximity, traffic volume, and overall neighbourhood safety are considered to be important correlates affecting older adults' PA participation (Greaney et al., 2016). Perceived neighbourhood safety was identified as a barrier (n=7) to PA participation exclusively among the community dwelling older adults.

You would*n't go out on your own* at night around here. (F1: P5)

Participants from the assisted living retirement home did not view neighbourhood safety to be either a barrier to or facilitator of PA. This neighbourhood environment was perhaps viewed as the norm and therefore they did not associate safety concerns so acutely (Moran et al., 2015). This association could have also affected results obtained for the theme time/day of the week as such participants did not recognise this to be a barrier to PA participation either.

Time of day *wouldn't make much difference* [to PA participation]. *To be fair you aren't doing much at the weekend so day of the week isn't going to make much difference* [to PA participation] either. (F3: P1)

Conversely, community dwelling participants reported time/day of the week to be a barrier (n=15), with early morning or early evening sessions identified as reducing PA participation, especially during the winter months when daylight hours are more limited. These findings could have been further amplified by the neighbourhood safety concerns also identified by this group (Hoppmann et al., 2015; Prins and van Lenthe, 2015).

The theme of transportation (n=14) has been extensively reported to be both a barrier and facilitator to PA participation among older adults (Bouma, van Wilgen and Dijkstra, 2015; Haselwandter et al., 2015; Kosteli et al., 2016; Van Dyck et al., 2017). Within the current study transportation was identified as a barrier (n=10) restricting access to PA sessions regardless of living status.

I would like to go to the baths [swimming pool] but it*'s difficult to get there and* back so I just *don't bother.* (F4: P5)

Transport is especially important for those lacking the ability to be more independently mobile as it allows individuals to bridge larger distances than they could by walking alone (Van Cauwenberg et al., 2016). Thus, lack of access to a car and inadequate availability, frequency and reliability of affordable public transport are all associated with decreased PA participation (Newitt, Barnett and Crowe, 2016). Additionally, being dependent upon others (e.g., family, friends and peers) for transportation has been identified as a barrier to PA

participation within this population (Baert et al., 2015). This was also noted in the current study.

I think the worst thing is having to rely on somebody else to take you [to a PA session] as anything can happen in your own *life let alone somebody else's.* (F5: P2)

Prior research suggests the promotion of walking for transportation to PA sessions among physically independent older adults (Chudyk et al., 2017). However, given the neighbourhood safety concerns noted by participants, and the varying levels of functional ability among this population, further research examining access to PA sessions including walking facilities (e.g., path and crossing quality), traffic safety, and safety from crime is warranted (Van Cauwenberg et al., 2016).

< Insert Figure 2 about here >

Reinforcing Correlates

Figure 3 displays the reinforcing correlates of PA participation. Peer support is associated with PA adherence in older adults (Brown et al., 2015), and was identified as a key theme (n=18) and subsequent facilitator (n=13) to PA participation in the current study.

I've got to know everybody now and I'm used to you all. I feel more comfortable and I don't feel anxious or anything. (F3: P6)

Unsurprisingly, in light of the above several participants reported peers to be a barrier to PA participation (n=5) because of an unwillingness to attend other PA sessions due to anxieties about meeting new people.

*I wouldn't like to go somewhere else as I wouldn't like to w*alk in on a crowd of new people. (F3: P6)

Although group-based activities offer older adults the chance to gain a sense of belonging, enjoyment and establish friendships, designing sustainable exit routes in order to retain the provision of group activities which continue to facilitate, build and retain social bonds post-intervention should be considered by PA programmers and policymakers (Wu et al., 2015).

In line with recent research (Devereux-Fitzgerald et al., 2016; Smith et al., 2017), family members were identified as being both barriers (n=2) and facilitators (n=4) to PA participation. Specifically, a barrier often reported is overprotectiveness, in which family members may not allow older adults to participate in PA out of concern for their safety or health (Greaney et al., 2016). Participants among the community dwelling groups also noted this.

My sons in for a shock that we're coming to this as he's like, 'no long walks, no boat rides', he goes 'you're past it.' (F6: P2)

Such results suggest a need to educate family members on the importance and benefits of PA among older adults. Educational resources such as the older adults PA guidelines infographics for the, UK (Reid and Foster, 2016), Canada (Canadian Society for Exercise

Physiology, 2016), Australia (Australian Government Department of Health and Ageing, 2013), New Zealand (Ministry of Health, 2013), and the United States (CDC, 2008) are appropriate tools advocating for older adults to be active safely, and can be understood by family members plus health care providers. Furthermore, the adoption of local/national mass media messages may be a cost effective educational solution at a time when there is a growing ageing population (United Nations, 2015; UK Office for National Statistics, 2017). However, given the resistance to technology-based PA noted in the current study, further educational strategies promoting enjoyable, easy-to-use technology within a family environment are needed for community dwelling older adults (Bird et al., 2015). Participants within the assisted living group did not perceive family members to be either barriers or facilitators to PA participation and thus, further research is needed to identify approaches to involve family members as additional facilitators of PA participation within this group.

Participants viewed the theme of perceived health benefits (n=23) to be both a facilitator (n=14) and barrier (n=9) to PA participation regardless of living status. Participants were knowledgeable regarding the potential benefits of PA for their physical health.

It [PA] loosens all your limbs up. (F2: P2)

Participants also noted the potential benefits of PA for their psychological health.

The wellbeing [from PA participation] makes you feel better. (F1: P3)

Despite the irrefutable evidence demonstrating the benefits of PA among older adults (CDC, 2015; Reid and Foster, 2017; WHO, 2017), participants also noted health to be a potential

barrier (n=14) to PA participation due to doubts about their capabilities, or fear of causing themselves harm, particularly if they were unfamiliar with it.

People have to be sure they can come to PA sessions because my sister had *a heart attack… and she can't do a lot of t*hese exercises. (F1: P5)

To overcome such perceptions, educational strategies at a population level should focus on communicating the role of PA in gaining health benefits for all as well as how well-designed PA programmes can aid in the management of common comorbidities specific to this age group (Gillespie et al., 2012; Hamer, Lavoie and Bacon, 2013).

< Insert Figure 3 about here >

Taken together with the findings of recent qualitative studies examining correlates of PA participation among older adults living in both assisted living (Baert et al., 2016; Träff et al., 2017) and community dwelling older adults (Fisher et al., 2017; Phoenix and Tulle, 2017), results from this formative research study have been used to inform the design, delivery and recruitment strategies of an ongoing community PA intervention project. Specifically, changes implemented to programme design have included the introduction of, increased intervention duration from six to 12-weeks, maintenance sessions post-initial 12-week intervention, tea and coffee after each session to promote social interaction, and a reduction of early morning and late afternoon sessions. Changes to programme delivery have included the introduction of, participant choice in session activities, videoing participants at week 1 and week twelve to show participants their progression, and signposting participants to other local PA programmes. Finally, changes implemented to recruitment strategies have included,

improved relationships with general practitioners to enable them to refer participants onto the programme, leafleting in church halls and charity shops, and deliverers attending and subsequently advertising the programme at several Older Peoples' Forums. Such methods could also be adopted throughout similar community PA programmes elsewhere in order to increase programme fidelity, representativeness and effectiveness.

Strengths and Limitations

Methodological strengths include the exploration of consensus and associated discussion through the focus groups and subsequent analysis process which allowed insight into the predisposing, enabling and reinforcing correlates of PA participation among older adults. Consistency of themes, data credibility, transferability, and dependability were achieved through the triangulation consensus of data between authors and methods. While this study reiterates important insights into the perceived barriers, facilitators and opportunities for PA participation among both community dwelling and assisted living older adults, value outside of this to the wider research community may be limited due to programme funding which only allowed for formative research strategies to recruit participants who had agreed to take part in an ongoing PA programme. Consequently, sampling bias is a potential issue as it could be assumed that a high proportion of the participants were already inclined to be and/or currently physically active given the positive predisposing comments with regard to motivation towards PA and current lifestyle choices (Costello et al., 2011). This is especially important given that motivators and barriers toward regular PA vary among currently active and inactive adults across the age range (Costello et al., 2011; Hoare et al., 2017). Considering that less than 10% of older adults (≥ 65 years of age) meet the recommended PA guidelines (Jefferis et al., 2014), future research should seek to identify barriers and

facilitators among larger sample sizes of currently inactive older adults living within both the community and assisted living facilities.

Additionally, a small convenience pragmatic sub-sample of participants from one assisted living facility were recruited and hence results cannot be considered representative. Furthermore, men tend to decrease participation in leisure-time PA as they get older; whereas this dose-response is not seen among women (Amagasa et al., 2017). Consequently, there is the possibility of gender bias given the higher number of female participants recruited. However, the sample size, participants' ages and gender distribution are comparable to those reported in two recent studies examining barriers and facilitators to PA participation among older adults (Baert et al., 2015; Moran et al., 2015). Within these two studies the total number of participants was 15 (five male) and 40 (13 male) and the mean age of the respondents was 74 years, and 84 years, respectively. This compares to a total number of thirty-four participants (eight male) with a mean age of 78 years in the current study. Nevertheless, as well as exploring correlates of PA participation in relation to gender, functional status and age differences between the young-old (60-69 years), old-old (70-79 years), and oldest-old (80+ years) (Heo et al., 2017), future research should obtain additional participant characteristic data prior to the intervention including, participants' current sedentary time and PA levels, history of PA, family history of PA, ethnicity, employment status, and educational achievements as such have been shown to potentially affect the perceived barriers and facilitators to PA participation among older adults (Greaney et al., 2016; Keadle et al., 2016).

Conclusions

Older adults acknowledged the benefits of PA, not only for health but also those relating to socialising, enjoyment, relaxation, and physical and psychological wellbeing. The themes of opportunities and awareness for PA participation, cost, transport, location and season/weather varied dependent upon living status. These findings suggest current living status to be a separate correlate of PA participation among older adults. This data can be used to further strengthen the design, delivery and recruitment strategies of both the target GHGA PA intervention programme and international PA intervention programmes among older adults. Future interventions should consider educational strategies to communicate the role of PA in gaining health benefits for all, reducing SB, and countering the negative implicit attitudes that may undermine PA within this population. Given the small sample of participants in the current study, further comparative research exploring the barriers and facilitators between assisted living and community dwelling, and active and inactive older adults on both national and international levels is warranted.

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References

Active People Survey 2014. Active People Survey 8: Active People Interactive, available at: http://activepeople.sportengland.org/ [Accessed 9 October 2017].

Aggio, D., Fairclough, S., Knowles, Z. and **Graves, L.** 2016. Validity and Reliability of a Modified English Version of the Physical Activity Questionnaire for Adolescents. Archives of Public Health 74, (1), 3-11.

Al-Busaidi, Z. Q. 2008. Qualitative Research and its Uses in Health Care. Sultan Qaboos University Medical Journal 8, (1), 11-19.

Amagasa, S., Fukushima, N., Kikuchi, H., Takamiya, T., Oka, K. and **Inoue, S.** 2017. Light and sporadic physical activity overlooked by current guidelines makes older women more active than older men. International Journal of Behavioral Nutrition and Physical Activity 14, (1), 59-65.

Australian Government Department of Health and Ageing 2013. Recommendations on Physical Activity for Health for Older Australians, available at: http://www.health.gov.au/internet/main/publishing.nsf/content/130D93778A64136DCA257BF0001DACF2/$File/pa-guidelines.pdf [Accessed 9 October 2017].

Baert, V., Gorus, E., Calleeuw, K., De Backer, W. and **Bautmans, I.** 2016. An Administrator's Perspective on the Organization of Physical Activity for Older Adults in Long-Term Care Facilities. Journal of the American Medical Directors Association 17, (1), 75-84.

Baert, V., Gorus, E., Mets, T. and **Bautmans, I.** 2015. Motivators and Barriers for Physical Activity in Older Adults with Osteoporosis. Journal of Geriatric Physical Therapy 38, (3), 105-114.

Banerjee, A. T., Kin, R., Strachan, P. H., Boyle, M. H., Anand, S. S. and **Oremus, M.** 2015. Factors Facilitating the Implementation of Church-Based Heart Health Promotion Programs for Older Adults: A Qualitative Study Guided by the Precede-Proceed Model. American Journal of Health Promotion 29, (6), 365-373.

Barnes, J., Behrens, T.K., Benden, M.E., Biddle, S., Bond, D., Brassard, P., Brown, H., Carr, L., Chaput, J.P., Christian, H. and **Colley, R.** 2012. Letter to the Editor: Standardized use of the terms" sedentary" and" sedentary behaviours". Applied Physiology Nutrition and Metabolism-Physiologie Appliquee Nutrition Et Metabolisme 37, (3), 540-542.

Bird, M.L., Clark, B., Millar, J., Whetton, S. and **Smith, S.** 2015. Exposure to "Exergames" Increases Older Adults' Perception of the Usefulness of Technology for Improving Health and Physical Activity: A Pilot Study. JMIR Serious Games 3, (2), 1-8.

Boddy, L. M., Knowles, Z. R., Davies, I. G., Warburton, G. L., Mackintosh, K. A., Houghton, L. and **Fairclough, S. J.** 2012. Using Formative Research to Develop the Healthy Eating Component of the CHANGE! School-Based Curriculum Intervention. BMC Public Health 12, (1), 710-720.

Booth, F. W. and **Hawley, J. A.** 2015. The Erosion of Physical Activity in Western Societies: an Economic Death March. Diabetologia 58, (8), 1730-1734.

Borodulin, K., Sipilä, N., Rahkonen, O., Leino-Arjas, P., Kestilä, L., Jousilahti, P. and **Prättälä, R.** 2016. Socio-Demographic and Behavioral Variation in Barriers to Leisure-Time Physical Activity. Scandinavian Journal of Public Health 44, (1), 62-69.

Bouma, A. J., van Wilgen, P. and **Dijkstra, A.** 2015. The Barrier-Belief Approach in the Counseling of Physical Activity. Patient Education and Counseling, 98, (2), 129-136.

Braun, V. and **Clarke, V.** 2006. Using Thematic Analysis in Psychology. Qualitative Research in Psychology 3, (2), 77-101.

Brown, D., Spanjers, K., Atherton, N., Lowe, J., Stonehewer, L., Bridle, C. ... **and Lamb, S. E.** 2015. Development of an Exercise Intervention to Improve Cognition in People with Mild to Moderate Dementia: Dementia and Physical Activity (DAPA) Trial, Registration ISRCTN32612072. Physiotherapy 101, (2), 126-134.

Canadian Society for Exercise Physiology 2016. Canadian Physical Activity Guidelines for Older Adults – 65 Years and Older, available at: https://www.participaction.com/sites/default/files/downloads/Participaction-Canadian-physical-activity-guidelines-older-adult.pdf [Accessed 9 October 2017].

Carstensen, L. L., Isaacowitz, D. M. and **Charles, S. T.** 1999. Taking Time Seriously: A Theory of Socioemotional Selectivity. American Psychologist 54, (3), 165-181.

Centers for Disease Control and Prevention 2008. Physical Activity Guidelines for Americans: Fact Sheet for Health Professionals on Physical Activity Guidelines for Older Adults, available at: http://www.cdc.gov/physicalactivity/downloads/pa_fact_sheet_olderadults.pdf [Accessed 9 October 2017].

Centers for Disease Control and Prevention 2015. How Much Physical Activity do Older Adults Need?, available at: https://www.cdc.gov/physicalactivity/basics/older_adults/ [Accessed 12 October 2017].

Chastin, S., Gardiner, P.A., Ashe, M.C., Harvey, J.A., Leask, C.F., Balogun, S., Helbostad, J.L. and **Skelton, D.A.** 2017. Interventions for reducing sedentary behaviour in community- dwelling older adults. The Cochrane Library, 1-13.

Chudyk, A.M., McKay, H.A., Winters, M., Sims-Gould, J. and **Ashe, M.C.** 2017. Neighborhood walkability, physical activity, and walking for transportation: A cross-sectional study of older adults living on low income. BMC geriatrics 17, (1), 82-95.

Costello, E., Kafchinski, M., Vrazel, J. and **Sullivan, P.** 2011. Motivators, barriers, and beliefs regarding physical activity in an older adult population. Journal of geriatric physical therapy 34, (3), 138-147.

Department for Communities and Local Government 2015. The English Index of Multiple Deprivation (IMD) 2015 – Guidance, available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/464430/English_Index_of_Multiple_Deprivation_2015_-_Guidance.pdf [Accessed 9 October 2017].

Department of Health 2011. Physical Activity Guidelines in the UK: Review and Recommendations, available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/213743/dh_128255.pdf [Accessed 9 October 2017].

Devereux-Fitzgerald, A., Powell, R., Dewhurst, A. and **French, D.P.** 2016. The Acceptability of PA Interventions to Older Adults: A Systematic Review and Meta-Synthesis. Social Science & Medicine 158, 14-23.

Edwards, M.K. and **Loprinzi, P.D.** 2016. The Association between Sedentary Behavior and Cognitive Function among Older Adults May Be Attenuated with Adequate Physical Activity. Journal of Physical Activity and Health 14, (1), 52-58.

Emdadi, S., Hazavehie, S.M.M., Soltanian, A., Bashirian, S. and **Heidari Moghadam, R.** 2015. Predictive Factors of Regular Physical Activity among Middle-Aged Women in the West of Iran, Hamadan: Application of PRECEDE Model. Journal of research in health sciences 15, (4), 244-249.

Falck, R.S., Davis, J.C. and **Liu-Ambrose, T.** 2016. What is the association between sedentary behaviour and cognitive function? A systematic review. British Journal of Sports Medicine 51, (10), 800-811.

Fisher, K.L., Harrison, E.L., Bruner, B.G., Lawson, J.A., Reeder, B.A., Ashworth, N.L., Sheppard, M.S. and **Chad, K.E.** 2017. Predictors of Physical Activity Levels in Community Dwelling Older Adults: A Multivariate Approach Based on a Socio-Ecological Framework. Journal of Aging and Physical Activity, 1-23.

Forbes, D., Thiessen, E.J., Blake, C.M., Forbes, S.C. and **Forbes, S.** 2013. Exercise Programs for People with Dementia. Cochrane Handbook for Systematic Reviews of Interventions 12, 1-72.

Franco, M.R., Tong, A., Howard, K., Sherrington, C., Ferreira, P.H., Pinto, R.Z. and **Ferreira, M.L.** 2015. Older People's Perspectives on Participation in Physical Activity: A Systematic Review and Thematic Synthesis of Qualitative Literature. British Journal of Sports Medicine 49, (19), 1268-1276.

French, D.P., Olander, E.K., Chisholm, A. and **McSharry, J.** 2015. Which Behaviour Change Techniques are Most Effective at Increasing Older Adults' Self-efficacy and Physical Activity Behaviour? A Systematic Review. Annals of Behavioural Medicine 48, (2), 225-234.

Gagliardi, A. R., Faulkner, G., Ciliska, D. and **Hicks, A.** 2015. Factors Contributing to the Effectiveness of Physical Activity Counselling in Primary Care: A Realist Systematic Review. Patient Education and Counseling 98, (4), 412-419.

Garcia, J.A., Schoene, D., Lord, S.R., Delbaere, K., Valenzuela, T. and **Navarro, K.F.** 2016. A Bespoke Kinect Stepping Exergame for Improving Physical and Cognitive Function in Older People: A Pilot Study. Games for Health Journal 5, (6), 382-388.

Gardiner, C., Geldenhuys, G. and **Gott, M.** 2016. Interventions to Reduce Social Isolation and Loneliness Among Older People: An Integrative Review. Health & Social Care in the Community, 1-17.

Gillespie, L.D., Robertson, M.C., Gillespie, W.J., Sherrington, C., Gates, S., Clemson, L.M. and **Lamb, S.E.** 2012. Interventions for Preventing Falls in Older People Living in the Community. Cochrane Handbook for Systematic Reviews of Interventions 9, 1-420.

Glasgow, R.E., Green, L.W., Taylor, M.V. and **Stange, K.C.** 2012. An evidence integration triangle for aligning science with policy and practice. American journal of preventive medicine 42, (6), 646-654.

Gray, P.M., Murphy, M.H., Gallagher, A.M. and **Simpson, E.E.** 2015. Motives and Barriers to Physical Activity among Older Adults of Different Socio-Economic Status. Journal of Aging & Physical Activity 24, (3), 419-429.

Greaney, M.L., Lees, F.D., Blissmer, B.J., Riebe, D. and **Clark, P.G.** 2016. Psychosocial Factors Associated With Physical Activity in Older Adults. Annual Review of Gerontology and Geriatrics 36, (1), 273-291.

Green, L. W. and **Kreuter, M. W.** (4th ed.) 2005. Health Program Planning: An Educational and Ecological Approach. New York: McGraw-Hill.

Hamer, M., Lavoie, K.L. and **Bacon, S.L.** 2013. Taking up Physical Activity in Later Life and Healthy Ageing: The English Longitudinal Study of Ageing. British Journal of Sports Medicine 48, (3), 239-243.

Haselwandter, E. M., Corcoran, M. P., Folta, S. C., Hyatt, R., Fenton, M. and **Nelson, M. E.** 2015. The Built Environment, Physical Activity, and Aging in the United States: A State of the Science Review. Journal of Aging and Physical Activity 23, (2), 323-329.

Hawley-Hague, H., Horne, M., Skelton, D. A. and **Todd, C.** 2016. Older Adults' Uptake and Adherence to Exercise Classes: Instructors' Perspectives. Journal of Aging and Physical Activity 24, (1), 119-128.

Healy, G.N., Winkler, E.A., Owen, N., Anuradha, S. and **Dunstan, D.W.** 2015. Replacing sitting time with standing or stepping: associations with cardio-metabolic risk biomarkers. European Heart Journal 36, (39), 2643-2649.

Heo, J., Chun, S., Kim, B., Ryu, J. and **Lee, Y.** 2017. Leisure activities, optimism, and personal growth among the young-old, old-old, and oldest-old. Educational Gerontology 43, (6), 289-299.

Hildebrand, M. and **Neufeld, P.** 2009. Recruiting Older Adults into a Physical Activity Promotion Program: Active Living Every Day Offered in a Naturally Occurring Retirement Community. The Gerontologist 49, (5), 702-710.

Hoare, E., Stavreski, B., Jennings, G.L. and **Kingwell, B.A.** 2017. Exploring motivation and barriers to physical activity among active and inactive Australian adults. Sports 5, (3), 47-54.

Hoppmann, C.A., Lee, J.C.M., Ziegelmann, J.P., Graf, P., Khan, K.M. and **Ashe, M.C.** 2015. Precipitation and Physical Activity in Older Adults: The Moderating Role of Functional Mobility and Physical Activity Intentions. The Journals of Gerontology Series B: Psychological Sciences and Social Sciences 72, (5), 792–800.

Jefferis, B.J., Sartini, C., Lee, I.M., Choi, M., Amuzu, A., Gutierrez, C., Casas, J.P., Ash, S., Lennnon, L.T., Wannamethee, S.G. and **Whincup, P.H.** 2014. Adherence to Physical Activity Guidelines in Older Adults, Using Objectively Measured Physical Activity in a Population-Based Study. BMC Public Health 14, (1), 1-9.

Keadle, S. K., McKinnon, R., Graubard, B. I. and **Troiano, R. P.** 2016. Prevalence and Trends in Physical Activity among Older Adults in the United States: A Comparison across Three National Surveys. Preventive Medicine 89, 37-43.

Kim, J., Im, J.S. and **Choi, Y.H.** 2016. Objectively measured sedentary behavior and moderate-to-vigorous physical activity on the health-related quality of life in US adults: The National Health and Nutrition Examination Survey 2003–2006. Quality of Life Research 26, (5), 1315-1326.

Knowles, Z. R., Parnell, D., Stratton, G. and **Ridgers, N. D.** 2013. Learning from the Experts: Exploring Playground Experience and Activities using a Write and Draw Technique. Journal of Physical Activity & Health 10, (3), 406-415.

Kosteli, M.C., Williams, S.E. and **Cumming, J.** 2016. Investigating the psychosocial determinants of physical activity in older adults: a qualitative approach. Psychology & health 31, (6), 730-749.

Lewis, B.A., Napolitano, M.A., Buman, M.P., Williams, D.M. and **Nigg, C.R.** 2017. Future directions in physical activity intervention research: expanding our focus to sedentary behaviors, technology, and dissemination. Journal of behavioral medicine 40, (1), 112-126.

Mackintosh, K. A., Knowles, Z. R., Ridgers, N. D. and **Fairclough, S. J.** 2011. Using Formative Research to Develop Change!: A Curriculum-Based Physical Activity Promoting Intervention. BMC Public Health 11, (1), 831-843.

Martin, A., Fitzsimons, C., Jepson, R., Saunders, D.H., van der Ploeg, H.P., Teixeira, P.J., Gray, C.M. and **Mutrie, N.** 2015. Interventions with potential to reduce sedentary time in adults: systematic review and meta-analysis. British Journal of Sports Medicine 49, (16), 1056-1063.

McMahon, S. K., Lewis, B., Oakes, J. M., Wyman, J. F., Guan, W. and **Rothman, A. J.** 2017. Assessing the Effects of Interpersonal and Intrapersonal Behavior Change Strategies on Physical Activity in Older Adults: a Factorial Experiment. Annals of Behavioral Medicine 51, (3), 376–390.

Middelweerd, A., Mollee, J.S., van der Wal, C.N., Brug, J. and **te Velde, S.J.** 2014. Apps to promote physical activity among adults: a review and content analysis. International journal of behavioral nutrition and physical activity 11, (1), 97-106.

Milligan, C., Payne, S., Bingley, A. and **Cockshott, Z.** 2015. Place and Wellbeing: Shedding Light on Activity Interventions for Older Men. Ageing and Society 35, (01), 124-149.

Ministry of Health 2013. Guidelines on Physical Activity for Older People (Aged 65 Years and Over), available at: https://www.health.govt.nz/system/files/documents/publications/guidelines-on-physical-activity-older-people-jan13-v3.pdf [Accessed 9 October 2017].

Moran, F., MacMillan, F., Smith-Merry, J., Kilbreath, S. and **Merom, D.** 2015. Perceived Barriers, Facilitators and Patterns of Physical Activity of Older-old Adults Living in Assisted Retirement Accommodation. Journal of Gerontology & Geriatric Research 4, (6), 1-6.

Newitt, R., Barnett, F. and **Crowe, M.** 2016. Understanding factors that influence participation in physical activity among people with a neuromusculoskeletal condition: A review of qualitative studies. Disability and rehabilitation 38, (1), 1-10.

Nicholson, N.R. 2012. A review of social isolation: an important but underassessed condition in older adults. The journal of primary prevention 33, (2-3), 137-152.

Noonan, R. J., Boddy, L. M., Fairclough, S. J. and **Knowles, Z. R.** 2016a. Parental perceptions on childrens out-of-school physical activity and family-based physical activity. Early Child Development and Care, 1-16. doi:10.1080/03004430.2016.1194409

Noonan, R.J., Boddy, L.M., Fairclough, S.J. and **Knowles, Z.R.** 2016b. Write, draw, show, and tell: a child-centred dual methodology to explore perceptions of out-of-school physical activity. BMC public health 16, (1), 326-344.

Notthoff, N., Klomp, P., Doerwald, F. and **Scheibe, S.** 2016. Positive Messages Enhance Older Adults' Motivation and Recognition Memory for Physical Activity Programmes. European Journal of Ageing 13, (3), 1-7.

Orr, N. and **Phoenix, C.** 2015. Photographing physical activity: using visual methods to 'grasp at'the sensual experiences of the ageing body. Qualitative Research 15, (4), 454-472.

Owen, N., Healy, G.N., Matthews, C.E. and **Dunstan, D.W.** 2010. Too much sitting: the population-health science of sedentary behavior. Exercise and sport sciences reviews 38, (3), 105-113.

Petrescu-Prahova, M., Belza, B., Kohn, M. and **Miyawaki, C.** 2015. Implementation and Maintenance of a Community-Based Older Adult Physical Activity Program. The Gerontologist 56, (4), 1-10.

Phillips, L.J. and **Flesner, M.** 2013. Perspectives and Experiences Related to Physical Activity of Elders in Long-Term-Care Settings. Journal of Aging & Physical Activity 21, (1), 33-50.

Phoenix, C. and **Tulle, E.** 2017. Physical activity and ageing. IN: J. Piggin, L. Mansfield, and M. Weed, eds. The Routledge handbook of physical activity policy and practice. London: Routledge.

Plotnikoff, R. C., Lubans, D. R., Penfold, C. M. and **Courneya, K. S.** 2014. Testing the utility of three social- cognitive models for predicting objective and self- report physical activity in adults with type 2 diabetes. British journal of health psychology 19, (2), 329-346.

Prince, S. A., Saunders, T. J., Gresty, K. and **Reid, R. D.** 2014. A comparison of the effectiveness of physical activity and sedentary behaviour interventions in reducing sedentary time in adults: A systematic review and meta-analysis of controlled trials. Obesity Reviews 15, (11), 905-919.

Prins, R.G. and **van Lenthe, F.J.** 2015. The Hour-to-Hour Influence of Weather Conditions on Walking and Cycling among Dutch Older Adults. Age & Ageing 44, (5), 1-5.

Reid, H. and **Foster, C.** 2016. Infographic. Physical Activity Benefits for Adults and Older Adults. British Journal of Sports Medicine 0, 1-2.

Rejeski, W.J., Axtell, R., Fielding, R., Katula, J., King, A.C., Manini, T.M., Marsh, A.P., Pahor, M., Rego, A., Tudor-Locke, C. and **Newman, M.** 2013. Promoting Physical Activity for Elders with Compromised Function: The Lifestyle Interventions and Independence for Elders (LIFE) Study Physical Activity Intervention. Clinical Interventions in Aging 8, 1119-1131.

Schneider, J. L., Goddard, K. A., Davis, J., Wilfond, B., Kauffman, T. L., Reiss, J. A. ... and **McMullen, C.** 2016. "Is It Worth Knowing?" Focus Group Participants' Perceived Utility of Genomic Preconception Carrier Screening. Journal of Genetic Counseling 25, (1), 135-145.

Shaw, R.J., Čukić, I., Deary, I.J., Gale, C.R., Chastin, S.F., Dall, P.M., Skelton, D.A. and **Der, G.** 2017. Relationships between socioeconomic position and objectively measured sedentary behaviour in older adults in three prospective cohorts. BMJ Open 7, (6), 1-11.

Skjæret, N., Nawaz, A., Morat, T., Schoene, D., Helbostad, J. L. and **Vereijken, B.** 2016. Exercise and Rehabilitation Delivered through Exergames in Older Adults: An Integrative Review of Technologies, Safety and Efficacy. International Journal of Medical Informatics 85, (1), 1-16.

Smith, B. and **Caddick, N.** 2012. Qualitative Methods in Sport: A Concise Overview for Guiding Social Scientific Sport Research. Asia Pacific Journal of Sport and Social Science 1, (1), 60-73.

Smith, G.L., Banting, L., Eime, R., O'Sullivan, G. and **van Uffelen, J.G.** 2017. The association between social support and physical activity in older adults: a systematic review. International Journal of Behavioral Nutrition and Physical Activity 14, (1), 56-77.

Sport England 2012. GET HEALTHY, GET ACTIVE: Learn more about our initial investments into tackling inactivity from 2012-2016, available at: https://www.sportengland.org/our-work/health-and-inactivity/get-healthy-get-active/ [Accessed 9 October 2017].

Sport England 2015. Local Profile Tool, available at: http://www.sportengland.org/our-work/local-work/local-government/local-sport-profile/ [Accessed 9 October 2017].

Stewart, D. W. and **Shamdasani, P. N.** (vol. 20) 2014. Focus Groups: Theory and Practice. Sage publications.

Susan, J., Mallan, K., Callaway, L., Daniels, L.A. and **Nicholson, J.M.** 2017. A cross sectional comparison of predisposing, reinforcing and enabling factors for lifestyle health behaviours and weight gain in healthy and overweight pregnant women. Maternal and child health journal 21, (3), 626-635.

Träff, A.M., Cedersund, E. and **Nord, C.** 2017. Perceptions of physical activity among elderly residents and professionals in assisted living facilities. European Review of Aging and Physical Activity 14, (1), 2-11.

Tremblay, M. S., Aubert, S., Barnes, J. D., Saunders, T. J., Carson, V., Latimer-Cheung, A. E. . . . **Chinapaw, M. J. M.** 2017. Sedentary Behavior Research Network (SBRN) – Terminology Consensus Project process and outcome. International Journal of Behavioral Nutrition and Physical Activity 14, (1), 75-92.

Tucker, J. M., Welk, G. J. and **Beyler, N. K.** 2011. Physical Activity in US Adults: Compliance with the Physical Activity Guidelines for Americans. American Journal of Preventive Medicine 40, (4), 454-461.

UK Office for National Statistics 2017. Mid-2016 Population Estimates, available at: https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/bulletins/annualmidyearpopulationestimates/latest [Accessed 9 October 2017].

United Nations 2015. World Population Ageing Report, available at: http://www.un.org/en/development/desa/population/publications/pdf/ageing/WPA2015_Report.pdf [Accessed 9 October 2017].

Van Cauwenberg, J., De Bourdeaudhuij, I., Clarys, P., Nasar, J., Salmon, J., Goubert, L. and **Deforche, B.** 2016. Street characteristics preferred for transportation walking among older adults: a choice-based conjoint analysis with manipulated photographs. International journal of behavioral nutrition and physical activity 13, (1), 6-22.

Van Dyck, D., Mertens, L., Cardon, G., De Cocker, K. and **De Bourdeaudhuij, I.** 2017. Opinions toward Physical Activity, Sedentary Behavior, and Interventions to Stimulate Active Living During Early Retirement: A Qualitative Study in Recently Retired Adults. Journal of aging and physical activity 25, (2), 277-286.

Warmoth, K., Lang, I.A., Phoenix, C., Abraham, C., Andrew, M.K., Hubbard, R.E. and **Tarrant, M.** 2016. 'Thinking you're old and frail': a qualitative study of frailty in older adults. Ageing & Society 36, (7), 1483-1500.

Wilmot, E.G., Edwardson, C.L., Achana, F.A., Davies, M.J., Gorely, T., Gray, L.J., Khunti, K., Yates, T. and **Biddle, S.J.** 2012. Sedentary time in adults and the association with diabetes, cardiovascular disease and death: Systematic review and meta-analysis. Diabetologia 55, 2895-2905.

World Health Organization 2017. Global Strategy on Diet, Physical Activity and Health: Physical Activity and Older Adults, available at: http://www.who.int/dietphysicalactivity/factsheet_olderadults/en/ [Accessed 12 October 2017].

Wu, E., Barnes, D. E., Ackerman, S. L., Lee, J., Chesney, M. and **Mehling, W. E.** 2015. Preventing Loss of Independence through Exercise (PLIÉ): Qualitative Analysis of a Clinical Trial in Older Adults with Dementia. Aging & Mental Health 19, (4), 353-362.