

Older adults' construal of sedentary behaviour: Implications for reducing sedentary behaviour in older adult populations

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Abstract

Older adults are the most sedentary age group, with sedentary behaviour having negative health-related consequences. There is currently limited understanding of how older adults view sedentary behaviour. This study investigated older adults' understanding of the concept of sedentary behaviour. Semi-structured interviews were conducted with 22 community-dwelling older adults in urban North-West England, selected to be diverse in socio-economic background and activity levels. Interviews were recorded and transcribed verbatim. An inductive thematic analysis was conducted. Participants often construed sedentary behaviour as synonymous with a lack of physical activity, and many perceived reducing sedentary behaviour and increasing moderate-to-vigorous physical activity to be the same thing. Participants perceived the term 'sedentary' to have negative connotations and were often judgemental of people who engaged in high levels of sedentary behaviour. Most participants considered reducing sedentary behaviour to be of value, though more active individuals were unconvinced that reducing sedentary behaviour has value beyond the benefits of being physically active. Interventions may wish to provide education to address the misconception that increasing moderate-to-vigorous physical activity is necessary in order to reduce sedentary behaviour. Educating older adults on the independent health consequences of sedentary behaviour may also prove beneficial.

Keywords

Active ageing, framework analysis, interviews, physical activity, qualitative, theoretical domains framework

Background

Sedentary behaviour has been defined as an energy expenditure of ≤ 1.5 metabolic equivalents (a measure of the energy cost of physical activities), undertaken while in a sitting or reclining position during waking hours (Sedentary Behaviour Research Network, 2012). This is distinct from light physical activity which may be undertaken in a sitting position but involves energy expenditure between 1.6 and 2.9

metabolic equivalents, for example, cooking, slow walking and doing arm exercises while sitting (Pate et al., 2008). Sedentary behaviour is

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also distinct from both active and passive standing behaviours (Tremblay et al., 2017). Sedentary behaviour is therefore not merely the absence of moderate-to-vigorous physical activity and may be reduced through increasing sit-to-stand transitions, standing time and/or light physical activity (including active sitting).

There is now strong evidence that sedentari-ness is a risk factor for obesity, diabetes, heart disease, cancer and premature mortality (Thorp et al., 2011; Wilmot et al., 2012). Some research suggests that the risks associated with sedentary behaviour are independent of the amount of physical activity a person engages in for both older adult and younger adult populations (Dunstan et al., 2010; Rezende et al., 2014). More recent evidence suggests that the magnitude of risk is attenuated in those who are physically active (Ekelund et al., 2016), but in light of the low levels of physical activity globally, reducing sedentary behaviour remains an important objective.

Older adults are the most sedentary and least physically active age group (Rezende et al., 2014), with older adults typically engaging in an average of 9.4 hours of sedentary behaviour per day (Harvey et al., 2015). Much of this sedentary time is spent on leisure pursuits within the home, and often in social isolation (Leask et al., 2015). In addition to the aforementioned health risks, greater levels of sedentary behaviour negatively impact overall successful ageing in older adults, including physical (e.g. functional impairment), psychological (e.g. cognitive function, depression) and social (e.g. sense of belonging, loneliness) components of ageing (Dogra and Stathokostas, 2012). Interventions seeking to reduce sedentary behaviour are likely to be more acceptable to older adults than interventions promoting increases in moderate-to-vigorous physical activity. A recent systematic review of qualitative studies embedded within physical activity trials found that older adults placed low value on engaging in physical activity as an activity of itself (Devereux-Fitzgerald et al., 2016). Furthermore, they often perceived low levels of day-to-day activity as sufficient. A complementary systematic review examined

qualitative studies of inactive older adult populations independent of trials (McGowan et al., 2018). This review showed that inactive older adults considered physical activity to be incompatible with their self-perceptions as ageing members of society and questioned the usefulness of physical activity during the latter stages of life.

Three recent systematic reviews and meta-analyses have investigated the effectiveness of interventions to reduce sedentary behaviour in general adult populations (Gardner et al., 2016; Martin et al., 2015; Prince et al., 2014). Interventions primarily focusing on physical activity, or including both physical activity and sedentary behaviour components, resulted in smaller reductions in sedentary time compared to interventions targeting only sedentary behaviour. This provides a strong rationale for interventions to be developed that focus solely on sedentary behaviour.

There is, however, a dearth of evidence examining the effects of interventions to reduce sedentariness in older adults specifically (Copeland et al., 2017; Martin et al., 2015). Most studies aiming to reduce sedentariness have been conducted with younger adult populations, but the needs of older adults may differ from those of younger adults. A systematic review of physical activity intervention trials with older people indicated that those containing behaviour change techniques (BCTs) involving self-regulatory skills (e.g. goal setting, self-monitoring) led to smaller increases in physical activity than interventions not including such techniques (French et al., 2014). These BCTs were apparently included on the basis that they were effective at increasing physical activity with younger adults (Williams and French, 2011). Thus, there are grounds to believe that interventions which effectively reduce sedentary behaviour in younger adults may not be effective for older adult populations.

Recently, various feasibility studies have offered preliminary evidence that interventions focusing solely on sedentary behaviour are acceptable and can lead to reductions in

sedentary time in older adults aged 60 years and above (Fitzsimons et al., 2013; Lewis et al., 2016; Rosenberg et al., 2015; White et al., 2017). However, global physical activity guidelines classify older adults as those aged 65 years and above (World Health Organization, 2010a). Therefore, the inclusion of younger adults in these studies may have positively biased the results, as young-old adults may be more amenable to behaviour change and have fewer barriers to reducing sedentary behaviour.

A pilot study by Harvey et al. (2018) did focus on older adults aged 65 years and above and found that a sedentary behaviour reduction intervention based on motivational sessions and retrospective feedback could lead to meaningful gains in physical function in frail older adults. Interestingly, the intervention did not lead to decreases in total duration of sedentary behaviour; however, breaks in sedentary time did increase. This suggests that breaking up periods of prolonged sitting may be more acceptable than attempting to reduce overall sedentary time for some older adults and can lead to positive functional health outcomes.

It is notable that none of the aforementioned feasibility or pilot studies considered the socio-economic status of participants. This is an important omission, as low socio-economic groups face more barriers to physical activity participation (World Health Organization, 2010b), so may also face more barriers to reducing sedentary behaviour. Research is needed to address the potential for interventions to reduce sedentary behaviour in older adults with a minimum age of 65 years, and from diverse socio-economic backgrounds.

When developing an intervention, ascertaining the potential acceptability of an intervention to the target population using qualitative methods has been advised (Craig et al., 2008). However, to the authors' knowledge, only three explorative qualitative studies have been published to date concerning older adults and sedentary behaviour. One study identified pain, social pressure to sit and rest, and lack of environmental facilities as perceived determinants of sedentary behaviour in older adults (Chastin

et al., 2014). Unfortunately, interviews were not audio-recorded and transcribed in this study, and the lack of participant quotations makes it difficult to assess whether author interpretations accurately reflect participant views.

A second qualitative study found that older adults had negative perceptions and varied understandings of the term 'sedentary behaviour' (McEwan et al., 2017), while another found that older adults were unaware of the health risks of sedentary behaviour and therefore were not motivated to reduce their sedentary time (Van Dyck et al., 2017). While providing novel insight into older adults' perceptions of the term 'sedentary' and the effects of sedentary behaviour on health, these studies have some notable limitations. The sample used by McEwan et al. (2017) were regular attenders of community social groups, thus limiting generalizability to more socially isolated older adults, who represent a key target population for reducing sedentary behaviour (Netz et al., 2013). Similarly, Van Dyck et al. (2017) used a sample who were a particularly active and 'younger' older adult cohort (only 13.5% did not reach international physical activity guidelines, and mean age was 62.9 years). More research is needed that represent the views of older, less active and more socially isolated older adult groups to inform interventions with a wider older adult population.

Use of theoretical approaches facilitates understanding of the likely processes involved in behaviour change, which is imperative to the development of interventions (Craig et al., 2008). The Theoretical Domains Framework (Michie et al., 2005) provides an overarching framework incorporating 128 theoretical constructs from 33 behavioural theories. The Theoretical Domains Framework identifies 14 theoretically distinct domains (Cane et al., 2012), each consisting of a grouping of theoretical constructs. Use of the Theoretical Domains Framework in qualitative research has the capacity to elicit a more comprehensive range of beliefs and is therefore particularly appropriate for use in exploratory health behaviour change research (Dyson et al., 2011; Francis et al., 2012).

Given the paucity of well-conducted, in-depth qualitative research investigating older adults' views of sedentary behaviour, we conducted a qualitative study investigating the views of men and women aged 65 years and above, from diverse socio-economic areas, concerning sedentary behaviour. The overall aim was to explore factors related to the acceptability of reducing sedentary behaviour in this population. This article focuses on a sub-set of findings relating to how older adults understand the concept of sedentary behaviour, which was discovered within the wider research project and merited in-depth analysis in its own right. Wider findings of the study are published elsewhere (McGowan et al., 2019). The aim of this study was to explore older adults' construal of sedentary behaviour.

Methods

Design

This was a qualitative study employing inductive thematic analysis structured using the Framework approach (Gale et al., 2013). Semi-structured interviews were conducted face to face. Open-ended questions afforded flexibility to allow important ideas to be pursued in further detail while ensuring that the relevant topics were addressed (Britten, 1995).

Participants

A sample of 22 community-dwelling older adults aged 65 years and above and living independently in the community were recruited. Participants were purposively selected to be diverse in terms of gender, current activity levels, and socio-economic status based on area of residence. Individuals with impaired cognitive function and limited functional mobility were excluded.

Research team and reflexivity

The lead author is a White-British female doctoral student with a background in Psychology.

Prior to conducting the interviews, the researcher undertook a 3-day training course on qualitative interviewing and had previously received training on this during her master's degree. She has also previously published using qualitative methods. The research team further consisted of the lead author's two supervisors, both from health psychology backgrounds, who have together published over 30 qualitative papers, using thematic analysis, framework analysis, interpretive phenomenological analysis and meta-synthesis. The interviewer had no relationship with any of the interviewees prior to the study.

Interview guide

The interview topic guide included questions exploring perceptions of sedentary behaviour and factors that might influence older adults' sedentary and non-sedentary behaviours (Supplementary File 1). The topic guide was based on the 14 domains of the Theoretical Domains Framework. Rather than asking specific questions for each domain, broader open-ended questions were used to prompt respondents to discuss factors related to theoretical domains should they have been relevant. More general questions which were not related to the Theoretical Domains Framework were also employed. This ensured comprehensive theoretical coverage while maintaining flexibility for participants to discuss issues of importance to them, which may or may not fit within the Theoretical Domains Framework.

Prior to the interviews, a Patient and Public Involvement (PPI) session was carried out by the lead author with two older adults. Attendees gave feedback on the proposed research questions and interview topic guide, and modifications were made according to these discussions.

Procedure

Ethical approval was gained from the University Research Ethics Committee. Potential participants were approached through community groups (e.g. library groups, coffee mornings,

and luncheon clubs), poster advertisements and word of mouth. A contact was identified who was involved in activities seeking to reduce social isolation in older adults in a low socio-economic community. Through this contact, multiple participants were recruited who had high levels of sedentary behaviour, were socially isolated, and lived in low socio-economic residential areas. Those expressing interest in the study were given a participant information sheet containing details of the study and contact details for the researcher, and telephone numbers were taken from the potential participants. Participants were given at least 24 hours to consider their participation in the study, after which they were contacted by phone by the lead researcher. For those interested in participating, a brief screening call was conducted to ensure the participant met the inclusion criteria and an interview appointment was arranged. Each interview was conducted face to face by the first author in the participant's own home or in a private room on the University campus, according to participant preference. Interviews were audio-recorded and transcribed verbatim. Demographic information concerning age, gender, and area of residence was collected at the end of each interview (see Table 1).

Analysis

Interview transcripts were analysed inductively using thematic analysis (Braun and Clarke, 2006), whereby analysis was guided by the data rather than the domains of the Theoretical Domains Framework. The analysis was structured using the Framework approach (Ritchie and Spencer, 1995; see also Gale et al., 2013). The Framework method originated in social policy research but has become a well-used approach to analysis within qualitative health research more widely (Gale et al., 2013). The approach includes the use of matrices during the analysis process. These facilitate an in-depth, interpretative analysis of the data, by enabling comparison of thematic content across individual participants, while also retaining connections to other aspects of an individual's account

Table 1. Participant demographic characteristics.

Characteristic	Total (N=22)
Age (years)	
Mean (range)	77.5 (65–99)
Gender	
Female	14 (64%)
Male	8 (36%)
Ethnicity	
White British	18
White Irish	1
Black African/Caribbean	2
Jamaican Indian	1
Highest level of education	
Left school at 14	5
Post-14 education (<Bachelor's degree)	12
Bachelor's or postgraduate degree	5
Level of deprivation ^a	
High (1–3)	11
Medium (4–7)	6
Low (8–10)	5
Living status	
Alone	15
With partner	4
With family member	3

^aRanked in deciles according to the English Index of Multiple Deprivation (2015) measure of relative deprivation for small areas in England (1 = most deprived, 10 = least deprived).

so that perspectives are situated within wider context. This 'charting' process also has the benefit of increased transparency in the analytic process (Spencer et al., 2014). The analysis involved five main stages. (1) The first author read and re-read transcripts, noting key ideas. (2) The first author conducted line-by-line coding on a selection of interviews. Codes (descriptive labels assigned to excerpts of raw data) were then grouped according to similarities and differences, producing categories and codes. This resulted in a working thematic framework of codes contained within categories, which was refined as more transcripts were coded. (3) This thematic framework was then systematically applied to all the transcripts. This involved assigning each meaningful passage of text to the

appropriate code within the framework. To ensure the views of participants were reflected accurately, the whole research team indexed a selection of transcripts, with discrepancies discussed and resolved. (4) Each category was plotted onto a separate thematic matrix, with codes presented in separate columns, and participants (cases) on separate rows. Data were summarized into cells in the matrix according to the respective case and code (see Supplementary File 2). (5) The matrices were reviewed with the aim of understanding participants' perspectives, and connections were made within and between codes and cases. This facilitated the determination of the final themes and the key issues and meanings within those themes.

Results

Interviews lasted between 31 and 101 minutes (mean length 57 minutes). An overview of participant characteristics is shown in Table 1. Four themes relating to older adults' construal of sedentary behaviour were identified (understanding: sedentary behaviour vs physical activity; negative connotations of being sedentary; perceived/experienced outcomes; perceived value of reducing sedentary behaviour). Participants have been given pseudonyms to preserve anonymity, with age in years also provided alongside quotations.

Understanding: sedentary behaviour versus physical inactivity

Some participants were familiar with the terminology of 'sedentary behaviour' and could accurately define its meaning: 'Sitting and doing nothing' (Elaine, 70); 'Well it means if you're in the same position, sitting in the same position for a long time' (Alison, 85). Other participants had not heard this terminology prior to their involvement in the study but appeared to understand the term once a definition was given.

When discussing sedentary behaviour in their own terms, participants often used language such as 'sitting around', 'chilling out',

'lazing around' and 'putting my feet up' to describe periods of sedentary behaviour, and when discussing non-sedentary 'light' activity, participants commonly used expressions such as 'mooching', 'mulling' and 'pottering' around.

Despite many being able to discuss sedentary behaviour as a behaviour in itself, participants often struggled to distinguish between sedentary behaviour and (a lack of) physical activity when discussing wider issues. Participants often construed sedentary behaviour as synonymous with being inactive, equating sedentariness to a lack of engagement in physical activity or exercise rather than as a separate behaviour:

I don't think there's any [difference], I don't know what the difference would be. No I don't know. (Beryl, 86)

It appeared that older adults considered individuals to be on a single point on a linear continuum between sedentary and active, with 'sedentary' seemingly equated to being physically inactive. Typically, those who did not engage in moderate-to-vigorous physical activity were considered as sedentary people, and those who did as active people. They appeared to struggle to conceive the possibility that there can be an independence of these behaviours over time, such that an individual may sit for long periods of the day but also have high levels of physical activity (e.g. may engage in an hour of physical activity each day):

I know of some people who are at the gym three times a week you know doing walking and everything so we're not at the extremes, I think we're probably, in our circle, probably somewhere in the middle. (Jack, 68)

I'd say I'm more active than sedentary. (Christine, 75)

This confounded distinction was most apparent when speaking in the context of sedentary behaviour reduction. When asked about potential ways of reducing sedentary behaviour, participants frequently responded with activities that would be categorized as physical activities,

for example, 'swimming', 'dancing' and attending 'exercise classes', and many explicitly stated that they did not see any difference between reducing sedentary behaviour and increasing physical activity:

Well I would have thought they were both complementary, if you increase your physical activity you would be reducing your sedentary behaviour. (Elaine, 70)

Although it is true that sedentary behaviour will be reduced for the period of time in which physical activity is undertaken, participants struggled to conceive that sedentary behaviour could also be reduced without necessarily engaging in moderate-to-vigorous physical activity. As a result, most participants struggled to come up with suggestions to reduce sedentary behaviour that did not involve physical activity, without additional prompting.

The majority of participants, even those who were previously familiar with the term 'sedentary behaviour', appeared to have trouble speaking accurately about reducing sedentary behaviour. For example, this participant appeared to have a relatively accurate lay definition of sedentary behaviour:

Sitting on your bum all day long. Doing nothing much. Well sedentary means sat down doesn't it. What we're doing now. (Peter, 77)

However, when asked what reducing sedentary behaviour might involve, the same participant seemed to get confused:

Being less involved with the community, you know if that's possible. (Peter, 77)

Once the interviewer clarified the meaning of the question, the participant then responded with examples of moderate-to-vigorous physical activity as a means of reducing sedentary behaviour:

Well I could do more yoga for a start, perhaps go to yoga twice a week instead of once. Or go swimming or something extra, you know. (Peter, 77)

Older adults' ability to talk accurately about sedentary behaviour as an independent behaviour, but not in the wider context of reducing sedentary behaviour, may be due to confusion resulting from the negative framing of a message to reduce sedentary behaviour. When talking about sedentary behaviour itself they were able to draw upon concrete examples of behaviour, for example watching television; however, reducing sedentary behaviour, that is, 'doing less of nothing', can be a quite ambiguous concept. Should the message be framed positively, for example 'increasing light movement', it may be more easily construed. Indeed, some participants suggested that providing concrete examples of how their sedentary behaviour could be reduced would be effective:

I think it helps a lot of people to have concrete examples of the sorts of things because it gives pointers, directions for people to go with. (Jack, 68)

Negative connotations of being sedentary

Many older adults viewed extensive sedentary behaviour as having negative connotations, particularly with respect to watching a lot of television, and some expressed guilt over having sedentary periods:

I think a lot of people just sit all day watching the telly [television], and that is wrong. (Annie, 99)

To me it's just a miserable existence to just sit there watching television. (Alma, 85)

I think there's always a little bit of a guilt thing when you're sat on your bum . . . you say to yourself 'I shouldn't be doing this', but you do it. (James, 79)

Some participants also appeared to hold a strong judgement of other older adults who engaged in high levels of sedentariness in their daily lives. Negative terms, such as 'stick in the muds' and 'cabbages' were used by some participants to describe older adults who spend most of their days indoors engaging in high levels

of sedentary behaviour, with one participant referring to this lifestyle as ‘vegetating’ and ‘going mouldy’:

You know, it’s a bit blunt, but if you’re not doing anything with your life, if you’re not finding enjoyment . . . you might as well be dead . . . a lot of older people just sit and don’t see anything else, that is it that’s their lives and they don’t realize there’s so much more that they could do and achieve and benefit from. It’s sad, very sad. (Wendy, 71)

To a certain extent some of me thinks ‘well if they’re not gonna do it then bugger em, just let em slide into loneliness and depression and illness and let them go to hell in their own way’. (Sylvia, 65)

By contrast, one participant stated that sedentary behaviour ‘doesn’t have any negative connotations – it’s part of the variety of my life’ (Jack, 68). It seemed that this difference in perspective was due to this participant not perceiving his sedentary behaviour as a general lifestyle, but rather as a small aspect of an otherwise active and involved lifestyle and therefore he did not consider it as an unfavourable behaviour.

Perhaps due to the perceived negative connotations of being sedentary, it appeared that many participants were reluctant to self-identify as being sedentary:

I’m more physical than I am sedentary . . . I’ve never been someone to sit around. (Christine, 75)

I don’t think I sit down any more than somebody else. (Pauline, 90)

It may be that the negatively framed message of ‘reducing’ sedentary behaviour provokes defensiveness in participants. One participant directly acknowledged this and suggested that a positively framed message would elicit a preferable response to a negatively framed message:

‘Cause, just decreasing sedentary might be perceived as accusatory – you’re doing something

wrong . . . and I think people respond better to positive messages than to negative messages. (Jack, 68)

Perceived/experienced outcomes

Most participants had a good understanding of the negative consequences related to high levels of sedentary behaviour and could identify numerous disadvantages including: poor mental health, social isolation, increased risk of non-communicable diseases (e.g. diabetes/stroke), sarcopenia (i.e. loss of muscle mass and strength), poor circulation, and loss of vitality, independence and mobility. On the other hand, some older adults expressed experiencing positive outcomes of engaging in sedentary activities. Particularly for participants who considered themselves to be relatively active, periods of sedentariness were seen as necessary compensation for the activity they engaged in throughout the day and offered them a means to ‘relax’ and ‘re-energize’. Many participants stating that they found these periods ‘enjoyable’:

It’s a lovely feeling to sit down and rest. (Beryl, 86)

I think relaxing in the evening is a nice counterbalance to being physically or mentally or socially active throughout the day. (Jack, 68)

Some participants also recognized a circularity between reasons for engaging in prolonged periods of sedentary behaviour and the negative effects of such behaviour. One participant identified depression and ill health as reasons for sitting and staying indoors, however later reflected that ‘if I’ve not like gone out for say three or four days I actually get more depressed and ill . . . I feel stronger doing stuff’ (John, 65). Some participants described this pattern as a ‘vicious circle’ (Victoria, 74; Christine, 75; Elaine, 70):

Sometimes I’m tired so I sit down, other times I’m sat down and then I get tired because I’ve done it you know. Can work both ways. (Fred, 78)

My body's feeling weak and everything, yer know. Maybe with staying in all the time, that could be a part of it but I can't get out. (Nigel, 81)

Perceived value of reducing sedentary behaviour

The unclear distinction between reducing sedentary behaviour and increasing physical activity was again apparent when participants reflected on the benefits of reducing sedentary behaviour:

Well it's the same benefits as just being more physically active. (Sylvia, 65)

However, when guided into thinking about reducing sedentary behaviour as distinct from physical activity, many participants did agree that reducing sedentary behaviour would be of value (either to themselves or to others with high levels of sedentariness), with anticipated positive outcomes including increased social interaction, improved mobility and strength, lowered blood pressure, better circulation, distraction from pain, improved sleep, better mental health and improved cognitive functioning:

Whatever it is because once something is happening you don't remember the pain. (Simon, 75)

I think you should get up and walk around a lot more than people do. Because it keeps your circulation moving. (Annie, 99)

I think it would be good for it [mood] yes, yeah. Because if you're sitting down, you have more time to think and you're brooding. (Alison, 85)

There was, however, a notable distinction between those who self-reported engaging in relatively high activity levels compared to those self-reporting lower activity levels, with the former perceiving little value of reducing sedentary independent of engaging in physical activity:

Well I don't know that moving around the house is just- is going to be very beneficial. (Jane, 71)

Relatively minor from the evidence that I'm aware of because the evidence I'm aware of you've got to actually push your body a bit, to the extent you are increasing heart-rate. (Jack, 68)

Nevertheless, some such participants did express that they would consider reducing their sedentary behaviour should they be convinced that they would receive additional benefits:

I think I would have to be persuaded beyond what I'm aware of that I would get additional physical health benefits and possibly social benefits from that. And I'm yet to be persuaded of that. (Jack, 68)

The hours that I do spend doing nothing . . . I've never even considered the fact that it could be you know unbeneficial, if that's the terminology, to my health . . . so yeah I would, I would consider it if somebody suggested that I would definitely benefit from it. (Wendy, 71)

Discussion

Main findings

Many participants construed sedentary behaviour to be synonymous with a lack of physical activity and felt that reducing sedentary behaviour and increasing physical activity were one and the same thing. Participants therefore struggled to contemplate ways of reducing sedentary behaviour specifically. Participants perceived the term 'sedentary' to have negative connotations and those who considered themselves to be relatively active were often judgemental of those who engaged in high levels of sedentary behaviour. Perhaps because of this negative evaluation of the term 'sedentary', it appeared that many participants were reluctant to self-identify as being 'sedentary'. Many participants considered reducing their own sedentary behaviour to be of value, although those reporting relatively high activity levels appeared unconvinced that they would receive additional benefit on top of the benefits of being active.

Relationship to previous research

McEwan et al. (2017) found that older adults frequently used specific activities to define sedentary behaviour, for example, watching television, knitting and computer use. This is consistent with the present findings, whereby participants were able to speak accurately about sedentary behaviour in an isolated context when drawing upon such specific examples of behaviours. However, the present findings also show that older adults were less clear when speaking in the context of reducing sedentary behaviour, struggling to identify examples of ways to reduce sedentary behaviour that were not examples of physical activity behaviours. This suggests that older adults find it easier to think in terms of concrete activities and behaviours.

The current findings bear further similarity to those of McEwan et al. (2017) in which both studies identified that older adults perceived the term 'sedentary' as having negative connotations and were reluctant to self-identify with the term. Research based on Social Identity Theory suggests that belonging to a group perceived to be inferior can threaten well-being (Haslam et al., 2009). This aligns with older adults' reluctance to identify as being sedentary, as they did not want to be associated with a group that had negative connotations for their lifestyle and health.

Qualitative findings from Van Dyck et al. (2017) indicated that older adults were unaware of the negative consequences of sedentary behaviour and thus were not motivated to reduce their sedentary behaviour. The current findings build on this by showing a contrast between active and inactive participants in terms of the value they placed on reducing sedentary behaviour. Typically, less active participants felt that reducing sedentary behaviour would be of value to their physical and mental health. By contrast, those who engaged in higher levels of activity (as did Van Dyck et al.'s, 2017, participants) were sceptical of the benefits of becoming less sedentary, instead perceiving that such benefits could only be achieved through physical activity.

The findings presented in this study extend those of McEwan et al. (2017) and Van Dyck et al. (2017) by offering a more in-depth, interpretative view of older adults' construal of sedentary behaviour. Furthermore, the diversity of the sample of this study in terms of activity levels and social isolation enables generalizability of findings to a broader older adult population.

The findings of this study are also notable in the context of policies and guidelines relating to sedentary behaviour for older adults. Although current national and international guidelines incorporate recommendations to reduce sedentary behaviour in older adults, the primary focus is on increasing moderate-to-vigorous physical activity (UK Department of Health, 2011; World Health Organization, 2010a). Furthermore, there is no specific guidance on how sedentary behaviour can be reduced independent of increasing physical activity. The World Health Organization (2010a) identified sedentary behaviour as a research priority and this study adds to the gap in knowledge of how older adults construe sedentary behaviour and the implications for sedentary behaviour change interventions in this population.

Strengths and limitations

A major strength of the present research is the inclusion of older adults from both high and low areas of deprivation and of varying levels of activity and social isolation. This diversity enabled a broader range of perspectives to be captured. Use of the Theoretical Domains Framework to help inform the interview schedule increased the likelihood of a more comprehensive theoretical coverage, while also ensuring participants had the opportunity to discuss factors not related to theoretical constructs. Regular meetings were held with the whole research team to ensure interpretation remained true to the data and that alternative interpretations were considered.

A limitation of this study is the disproportionate representation of White British and female participants within the sample. Furthermore, we did not formally measure participants' sedentary

behaviour and physical activity levels, instead relying on their own descriptions of their daily routines and engagement in activities.

Implications

The results of this qualitative study offer clear implications for future interventions seeking to reduce sedentary behaviour in older adults. Older adults were found to conflate reducing sedentary behaviour with increasing physical activity. As previous work has found increasing physical activity to be unacceptable to older adults (McGowan et al., 2018), older adults may be unlikely to engage in a sedentary behaviour reduction intervention if they perceive reducing sedentary behaviour and increasing physical activity to be synonymous. An education element within interventions may be useful in addressing the notion that reducing sedentary behaviour necessitates increasing moderate-to-vigorous physical activity. Providing examples of ways in which sedentary behaviour may be reduced that do not necessarily involve high levels of physical activity may also prove effective and would be in line with participants' own ideas expressed within this study. It may also prove beneficial to incorporate these implications into future iterations of guidelines and policy recommendations targeting older adults. Such guidelines may usefully place a specific emphasis on sedentary behaviour as distinct from physical activity and provide advice on how reductions in sedentary behaviour can be achieved.

Furthermore, as some older adults in this study perceived there to be no added benefit of reducing their sedentary behaviour over and above their current levels of activity, education could be provided on the independent effects of sedentary behaviour on health. Although those with the highest levels of sedentary behaviour and lowest levels of physical activity will benefit most, reducing sedentary behaviour still offers additional benefit to those who do engage in some physical activity (Ekelund et al., 2016).

The results reported here also have implications for the way in which messages targeting older adults are framed, particularly with respect to guidelines and policy recommendations. As older adults perceive the term sedentary behaviour to have negative connotations and are often reluctant to identify with being sedentary, it might be more acceptable to frame the message positively, for example, 'increase light movement'. This may also serve to eliminate the confusion over the ambiguous negative message of 'doing less of nothing' and should ensure older adults do not construe the message as derogatory. Furthermore, use of the term 'sedentary' may alienate older adults; therefore, this terminology should be avoided as it may reduce adherence to guidelines or programmes in this population.

Future research

Future research should attempt to discern the best methods to engage highly sedentary older adults in research concerning sedentary behaviour, particularly those from minority ethnic groups. Furthermore, research should identify the most suitable language to use when discussing sedentary behaviour with older adults. Research should also discern how best to deliver messages to older adults that accurately convey what reducing sedentary behaviour might involve, clarifying the distinction between this and increasing physical activity. Finally, research should determine what BCTs and modes of delivery would be most successful in an intervention seeking to reduce sedentary behaviour in older adult populations.

Conclusion

Reducing sedentary behaviour offers significant health benefits for older adults, and this population is the most sedentary age group. The findings from this study provide novel insights into older adults' understanding and perceptions of sedentary behaviour. Older adults appear to construe sedentary behaviour as synonymous with a lack of physical activity, perceiving reducing

sedentary behaviour to involve increasing moderate-to-vigorous physical activity. The term 'sedentary' tends to have negative connotations and older adults seem reluctant to identify as being a 'sedentary person'.

Most older adults consider reducing sedentary behaviour to be of value, though more active older adults question the additional benefit of reducing sedentary behaviour on top of the benefits of being physically active. These findings offer important implications for the design and development of interventions when seeking to reduce sedentary behaviour in older adult populations.

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Data availability

The data that support the findings of this study are available on request from the corresponding author (L.J.M.). The data are not publicly available due to containing information that could compromise the privacy of research participants.

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Supplemental material

Supplemental material for this article is available online.

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