

INCREASING PHYSICAL ACTIVITY AND DECREASING SEDENTARY BEHAVIOUR IN
OLDER ADULTS: EXAMINING THE EFFECTS OF TRENDING NORMS ON
INTENTIONS AND BEHAVIOUR

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By

KARLY J. ANDERSON
(They/Them)

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ABSTRACT

The aging population in Canada is increasing, and with this increase, comes a corresponding increase in chronic diseases (Roberts et al., 2015). Among aging Canadians, two predictors of chronic disease development are physical inactivity and sedentarism – both of which are pervasive in society (Prince et al., 2020; Ross et al., 2020). As humans are social beings (Baumeister & Leary, 1995), one possible way to target a change in these behaviours is using social norms (Cialdini et al., 1990). The purpose of the current study was to examine whether trending norms (i.e., a minority norm that is increasing, Mortensen et al., 2019) would influence older adults' intentions and behaviours with respect to increasing physical activity and decreasing sedentary behaviour. Using an experimental design, older adults were randomly assigned to one of three message conditions: trending norm (an increasing number of older adults are increasing their walking and decreasing their sitting, $n=20$), trending norm with outcome expectation (an increasing number of older adults are increasing their walking and decreasing their sitting and are getting health benefits from the behaviour changes, $n=28$), or attention control (more older adults are increasing their hobbies, $n=25$). Results from a MANOVA revealed a significant omnibus main effect for messages on reported intention, Wilks' lambda $F(4, 138) = 2.50, p = .045, \eta_p^2 = .07$. Follow up ANOVAs revealed that intention to decrease sedentary behaviour was significant, $F(2, 70) = 4.03, p = .022, \eta_p^2 = .10$. Pairwise comparisons with Bonferroni correction examining intention to decrease sedentary behaviour revealed that those exposed to the trending norm combined with the outcome expectation reported a greater intention to decrease sedentary behaviour than those in the control condition ($p = .038$). No significant differences emerged between message conditions when examining physical activity or sedentary behaviours. These results provide preliminary experimental evidence that trending

norm messages may serve to increase older adults' intentions to decrease sedentary behaviour, but no evidence was provided to support trending norms increasing physical activity or decreasing sedentary behaviour.

Keywords: trending norm; physical inactivity; sedentary behaviour

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CHAPTER 1 INTRODUCTION

Older adults in Canada are the fastest growing population in the country. According to population projection scenarios, the proportion of older adults (aged 65 years and older) in Canada is expected to increase from 18.5% in 2021 to 29.5% by the year 2068 (Statistics Canada, 2021a). The increase in this age demographic also corresponds with an increasing prevalence of chronic diseases in Canada (Roberts et al., 2015).

It has been reported that 73% of older adults have at least 1 of 10 common chronic diseases (Public Health Agency of Canada, 2020). Individuals living with chronic disease(s) often report feelings of fear and anxiety which, in turn, can affect quality of life and daily functioning (Jia et al., 2013; Lebel et al., 2020; Shamsi et al., 2017). Thus, examining ways to minimize the effects of such chronic disease development in an increasingly aging population appears warranted.

One way to do this is through healthy living, defined by the Government of Canada (2021) as making positive choices that enhance one's personal physical, mental, and spiritual health. Healthy living involves many different strategies including reducing alcohol consumption and tobacco use, as well as improving nutrition, and sleep (Public Health Agency of Canada, 2020). By adopting such ways of living, one can prevent the progression of, or prolong the onset of, chronic diseases (Lee et al., 2012). Within this idea of a healthy living, being physically active has been identified as one of the most important steps older adults in Canada can take toward improving health and preventing disease progression (Canadian Medical Association, 2013).

According to the World Health Organization (2020), physical activity is defined as any bodily movement produced by skeletal muscles that requires energy expenditure. A previous

prospective cohort study conducted with participants from over 17 countries found that those who participate in higher physical activity had a lower risk of cardiovascular disease and mortality across high, middle, and low-income countries (Lear et al., 2017). Further, physical inactivity has been reported to be the cause of 9% of all instances of early death, equating to more than 5.3 million deaths worldwide (Lee et al., 2012). Of interest, promoting physical activity for health benefits and to prevent the development of chronic diseases is not a new idea. In fact, physical activity promotion dates back centuries. In the fifth century B.C., Hippocrates prescribed physical activity because he concluded that idleness could lead to disease (Tipton, 2014).

Despite this positive association between physical activity and health, physical activity levels remain low in Canadian adults, especially among those 65 years and older. Among all Canadians, those aged 65 years of age and older are the most inactive segment (Statistics Canada, 2021b). Currently, less than 33% of those aged 60-79 years are achieving the physical activity guidelines of 150 minutes of moderate-to-vigorous physical activity (MVPA) per week (Statistics Canada, 2021b).

Of note, while the 150 minutes of MVPA in bouts of at least 10 minutes has been viewed typically as the threshold to reduce health risk, light-intensity physical activities are now viewed as important given that several hours of light physical activities, including standing, have been shown to provide health benefits (Chastin et al., 2021; Ekelund et al., 2019). As one example, a recent study with older women found that participating in greater light-intensity physical activity was associated with a 42% reduction in the risk of myocardial infarction/coronary death as well as a 22% reduced risk of cardiovascular disease events even after adjusting for MVPA (LaCroix et al., 2019). Given that physical activity at any intensity is now recognized as important to

chronic disease prevention (Ross et al., 2020) and the 10-minute bout duration requirement has been eliminated from the threshold guideline (Prince et al., 2022), this study will focus on promoting light-intensity physical activity of any duration to improve the health of older adults.

While physical activity is undoubtedly important for improving health, is a singular focus on physical activity sufficient? As a partial answer to this question, the Canadian physical activity guidelines have been amended recently to also include the importance of reducing one's sedentary behaviour (Ross et al., 2020). Research indicates that higher levels of sedentary behaviour, defined as any waking behaviour performed in a lying, reclining, or sitting position with an energy expenditure of ≤ 1.5 metabolic equivalents (METs; Ross et al., 2020), is associated with an increased risk of chronic disease development and early mortality (Ekelund et al., 2019). Even among those who report meeting the threshold guideline, there is evidence that negative effects associated with sedentary time, such as increased all-cause mortality, remain (Biswas et al., 2015; Same et al., 2016). In effect, sedentary behaviour represents another distinct risk factor for poor health independent of the overall amount of physical activity (Same et al., 2016). Unfortunately, older adults have been reported to spend much of their time engaging in sedentary behaviours, averaging a total of 10 hours/day (Prince et al., 2020). Thus, if researchers hope to intervene to improve the health of this population it becomes clear that targeting both physical inactivity and sedentarism is essential as each represents a detrimental, independent predictor of health (Ekelund et al., 2016).

1.1 Promoting Health: Targeting Physical Activity and Sedentarism

Previous research promoting increases in physical activity and decreases in sedentary behaviours among older adults have used several different approaches. Many rely on behaviour change techniques such as goal setting, strategies to increase motivation and self efficacy, or

support consultations (Copeland et al., 2017; Taylor et al., 2021; Zubala et al., 2017) and most typically target each behavior separately. Given the independent detrimental effects of physical inactivity and sedentarism (Ekelund et al., 2016), rather than trying to change one over the other, another possible approach might be to target both behaviours together.

Recent research supports this suggestion. In Katzmarzyk and colleagues' (2020) review, they sought to answer the question of whether researchers and health practitioners should be targeting increased physical activity or reduced sedentary behaviour, with respect to reducing the risk of cardiovascular disease. They concluded that sitting less and moving more at any intensity should be encouraged among all adults moving forward. So, what does current research have to say about intervening on health-promoting behaviours together within the same intervention?

With respect to interventions targeting *both* sedentarism and physical inactivity, research is limited. According to a systematic review, in which interventions examining the effectiveness of jointly focusing on physical activity and sedentary components were included, joint interventions may result in modest reductions of daily sedentary time and increases in physical activity (Prince et al., 2014). Specific to older adults, one such joint physical activity/sedentary intervention applied a behaviour change technique consisting of an education booklet surrounding the health impact of sedentary behaviours and physical activity and “tips” to target such behaviours (White et al., 2017). Following the intervention, the authors reported that both were impacted. That is, sedentary behaviours (e.g., sitting time) decreased and physical activity (e.g., moderate and vigorous intensities as well as walking) increased, although the differences were not statistically different than the control. Given this trend, more research is needed to ascertain whether targeting and intervening on *both* physical activity and sedentary behaviours can be an effective method to target such detrimental behaviours. In terms of possible

approaches, given the inherent social nature of humans (Baumeister & Leary, 1995), targeting the influence of others appears worthy of consideration.

1.2 Influence of Others: Application of Social Norms

Being social beings, people rely on others for information (Baumeister & Leary, 1995) making social influence salient when people are making decisions. Social influence occurs when one individual responds to the actual or implied presence of others, be that one person or many (Turner, 1991). There are several sources of social influence including implicit influence, where members tend to mimic each other without noticing they are doing so (Chartrand & Bargh, 1999), informational influence in which members use others' responses as reference points for a behaviour (e.g., social comparison theory, Suls et al., 2000), and interpersonal influence where change is induced using verbal and nonverbal tactics (DeVito, 2013). However, one source of influence widely applied in physical activity research is normative influence/social norms.

Among social psychologists, there are several theories that apply social norms to individual behaviour. The one that features prominently when examining physical activity is the focus theory of normative conduct (focus theory, Cialdini et al., 1990). Within focus theory, there are two tenets (Cialdini et al., 1990). First, norms are categorized as either injunctive (what one 'ought' to do) or descriptive (what is currently being done), with the emphasis on the descriptive norm in the physical activity setting. The second tenet of focus theory suggests that individuals must attend to the normative information for behaviour change to occur. That is, the norm must contain information that the individual deems as important.

Guided by focus theory (Cialdini et al., 1990), research has established a clear relationship between descriptive norms and behaviour change involving both physical activity and sedentarism. Within the physical activity realm, many behaviours have been noted to change

including increasing overall physical activity (Priebe & Spink, 2012), increasing overall steps in a day (Wally & Cameron, 2017), improving balance (Spink et al., 2021), increasing stair usage (Crozier, 2019), and increasing physical activity during the university examination period (Crozier & Spink, 2017). Research examining the influence of descriptive norms on sedentary behaviours has received less attention as only two studies have been conducted to date (Priebe & Spink, 2015; Anderson et al., 2022). In these two intervention studies, it was found that the normative message influenced sedentary behaviours by decreasing sitting in office workers (Priebe & Spink, 2015) and increasing on-campus standing behaviours in university students (Anderson et al., 2022).

To my knowledge, only one study has applied social norms to influence physical activity in older adults (Koeneman et al., 2017). Although this study did not use focus theory, it did use descriptive norms. The results revealed a significant positive relationship between the descriptive norm information and one's intention to engage in physical activity-related activities.

While promising, a problem does arise when one considers the type of behaviour that is currently normative. Older adults are less active and more sedentary (Prince et al., 2020; Statistics Canada, 2021b). Thus, if one were to deliver a descriptive norm indicating what is currently being done, the message would portray that few older adults are active, and many are sedentary. The message being that physical inactivity and sedentary are the majority norms with the intended behaviors (i.e., increased physical activity and reduced sedentary behaviour) being in the minority.

This begs the question of what can be done if the intended behaviour is being done by the minority (i.e., minority norm)? Research has emerged indicating that reframing a minority descriptive norm message to reflect that the behaviour is increasing and may become a majority

behaviour with time may elicit positive behaviour change. This reframing is captured in the construct, trending norms (Mortensen et al., 2019).

1.3 The Emerging Descriptive Norm: Trending Norms

Trending norms are a type of descriptive norm that involve the perception that others are trying to change a behaviour even if the prevailing behaviour is performed by the minority (Mortensen et al., 2019). These norms identify change from one point in time to another and further indicate that engagement in a behaviour is increasing. Trending norms were first applied by Mortensen and colleagues (2019) to examine its effects on the behaviours of both water conservation and donations of time. Results for both behaviours indicated that trending norms had a significant effect on behaviour leading to increased water conservation and a greater willingness to donate one's time (Mortensen et al., 2019).

Trending norms also have been applied in the physical activity domain examining university students while on campus. Those exposed to a trending norm message were told that students on campus were engaging in more activity, although still a minority (i.e., 30% up from 20%) (Anderson et al., 2022). After the intervention, it was observed that those students exposed to the trending norm versus a control message reported a decrease in on-campus sedentary behaviour (i.e., standing up when sitting for long periods of time), but not an increase in on-campus physical activity.

In both trending norm studies (Anderson et al., 2022; Mortensen et al., 2019), the focus was on younger adult populations as well as on only one behaviour. This prompts two questions. The first surrounds the number of behaviours targeted. Previous research has applied trending norms to a single behaviour (e.g., water conservation; Mortensen et al., 2019). However, given

that older adults are typically both sedentary and physically inactive, can trending norms be applied to target these two behaviours simultaneously?

Although two behaviours have not been targeted simultaneously with trending norms, a systematic review evaluating the effectiveness of health behaviour change interventions indicated that targeting two behaviours together or separately will influence both behaviours (James et al., 2016). However, the authors also provided the caveat that more research was required as studies still exist suggesting different outcomes (Joseph et al., 2004; Vandelanotte et al. 2005; Wilcox et al., 2009). Given this caveat, and the fact that physical activity and sedentary behaviour have yet to be examined with respect to normative messaging, the current study examined increased physical activity and decreased sedentary behaviours together in the same intervention.

The second question surrounds whether trending norms will impact the behaviour of older adults. Trending norms can be classified as a type of descriptive norm (Mortensen et al., 2019) and as noted, descriptive norms on their own (e.g., merely describing what is currently being done) have led to changes in behaviour among the older adult population (Koeneman et al., 2017). While trending norms have not been examined with older adults to date, there is no evidence to suggest that this type of descriptive norm (trending norm) will not transfer to an older adult population.

1.4 Applying Trending Norms: The Importance of Saliency

As noted previously, Cialdini et al. (1990) concluded that a social norm – be it descriptive or injunctive in nature – is unlikely to motivate behaviour change unless it is focal, or salient, for an individual. To optimize the saliency of a normative message, it is important to

identify what older adults consider to be important reasons for both increasing physical activity as well reducing sedentary behaviour.

Behaviours resulting in some type of social, cognitive, or restorative benefit have been identified as high value activities by older adults and are perceived to be important (Palmer et al., 2018). Further, older adults report an important distinction between purposeful and passive activities as it relates to their daily sedentary behaviours (Palmer et al., 2018). Passive activities include behaviours that are perceived to be of low value (e.g., television viewing), whereas purposeful activities are perceived to result in an accumulation of positive outcomes and to be of high value (Palmer et al., 2018; Petrusovski et al., 2021). As researchers, it is important that we do not interfere with behaviours already benefiting this population. Therefore, rather than targeting sedentary behaviour broadly, which may include some purposeful activities (e.g., sitting with friends), targeting identified low-value passive behaviour (e.g., television viewing) might be more successful. The effectiveness of targeting these low-value passive sedentary behaviours also could be enhanced by including a positive outcome expectation (Bandura, 1986). This suggestion is described in more detail in a subsequent section.

When examining increasing physical activity, a similar line of reasoning emerges surrounding the importance of purposeful activities with this population. A recent review indicated that increasing older adult's motivation for movement involved focusing on purposeful movement activities that address the specific pragmatic needs of older adults (Petrusovski et al., 2021). For older adults, walking at a low intensity is likely perceived as purposeful as it has been reported to be the most preferred type of physical activity (Amireault et al., 2019).

Based on the preceding, targeting behaviours and environments specific to this population may serve to increase the saliency of the normative messages (e.g., building more

walking into daily tasks already performed and intentionally interrupting passive sedentary time that regularly occurs). While targeting context-specific behaviours in the social norm messaging is important for saliency, older adults also have reported that they would not want to engage in a behaviour where performing the behaviour is the sole objective (McGowan et al., 2019) (e.g., standing more to interrupt sedentary behaviour while watching television). Rather, participants expressed interest in engaging in such behaviours if something was being achieved and a benefit was anticipated (McGowan et al., 2019, 2021). This idea of anticipated benefit aligns with the outcome expectation construct (perceptions that a behaviour will lead to a specific outcome) housed within social cognitive theory (Bandura, 1986).

Outcome expectations have been used previously to increase salience in the norm/physical activity literature (Crozier & Spink, 2017). In line with the predictions of social cognitive theory and outcome expectations (Bandura, 1986), Crozier and Spink (2017) found a significant interaction between descriptive norms and positive outcome expectations (e.g., being physically active will lead to academic benefits). University students who received a descriptive norm message paired with a positive outcome expectation reported being more active during an examination period (when physical activity typically declines) versus those students who received a descriptive norm message and a low positive outcome expectation. Based on this empirical finding in the social norm literature (Crozier & Spink, 2017) and the theoretical underpinning of social cognitive theory (Bandura, 1986), positive outcome expectations were used in this study to increase the salience of the normative message.

In terms of possible positive outcome expectations, what do older adults value when it comes to the outcomes of increasing physical activity and decreasing sedentary behaviour? Research has revealed that the benefits of increasing physical activity and decreasing sedentary

behaviours identified by older adults often include outcomes such as increasing bone and muscle strength, improving one's ability to perform daily tasks/remain independent, improving mental health and alertness (e.g., positive feeling, stress relief), and improving cardiovascular health/preventing heart disease (Costello et al., 2011; Crombie et al., 2004; Huffman et al., 2021; McGowan et al., 2021). Therefore, the current study will seek to optimize outcome change by enhancing message saliency. This will be done by pairing trending norms with positive outcome expectations based on those perceived outcomes identified above by older adults. In terms of the outcomes in this study, both intentions and behaviour will be examined in accordance with previous intention-behaviour research.

1.5 Intention-Behaviour

Theories reflect the premise that the most important predictor of behaviour is one's intention to perform the behaviour (e.g., theory of reasoned action, Fishbein & Ajzen, 1975; theory of planned behaviour, Ajzen, 1991). Individuals tend to complete tasks/behaviours that they want to do whereas they do not complete those where they have no intention (Ajzen, 1991). Further, intentions are seen to provide an indication of how hard an individual is willing to try to perform the behaviour (Ajzen, 1991).

Chronological age has been proposed as one of the strongest predictors of physical activity intention (Massie et al., 2022). Programs aiming to increase physical activity and health promoting strategies among older adults would benefit from interventions that motivate physical activity intention prior to behaviour (Massie et al., 2022). However, as behaviour is still the goal of health-promoting initiatives, physical activity and sedentary behaviour also will be an outcome examined in the current study.

1.6 Purpose and Hypotheses

To my knowledge, no research to date has examined trending norms in an older adult population with any behaviour. This study has three main purposes. First, based on Canada's 24-hour Movement Guidelines and the call to 'move more' and 'sit less' (Ross et al., 2020) that is especially relevant for older adults (Prince et al., 2020; Statistics Canada, 2021b), the first purpose is to extend the findings for trending norms (Anderson et al., 2022; Mortensen et al., 2019) to older adults. The second purpose is to examine the effects of trending norms on *both* physical activity and sedentary intentions and behaviours. The third purpose is to examine whether the addition of positive outcome expectations would strengthen the effect of the social norm message on a) physical activity and sedentary intentions b) reported physical activity and sedentary behaviours.

Based on previous social norms research (Anderson et al., 2022; Mortensen et al., 2019) and theory (Bandura, 1986; Cialdini et al., 1990), the following hypotheses were examined.

1. Those exposed to the trending norm message will report greater intentions to increase physical activity and decrease sedentary behaviours than those exposed to an attention control message.
2. Those exposed to the trending norm message will report a greater increase in physical activity and decrease in sedentary behaviours than those exposed to an attention control message.
3. Those exposed to the trending norm message combined with the positive outcome expectation will report greater intentions to increase physical activity and decrease sedentary behaviours than those exposed to a trending norm or attention control message.

4. Those exposed to the trending norm message combined with the positive outcome expectation will report a greater increase in physical activity and decrease in sedentary behaviours than those exposed to a trending norm or attention control message.

In terms of possible differential differences between physical activity and sedentary intentions and behaviours, preliminary evidence targeting physical activity and sedentary behaviours with social norms suggests that there may be greater changes in sedentary than physical activity behaviours with young adults (Anderson et al., 2022). Previous research indicates that this also may be the case among older adults. Koltyn and colleagues (2019) found that older adults reported breaking up sitting time as more appealing than increasing physical activity. However, as these results come from a different population (i.e., university students, Anderson et al., 2022) and a small pilot study (Koltyn et al., 2019), a definitive hypothesis regarding the possible differential effects on increasing physical activity versus decreasing sedentary behaviour cannot be forwarded at this time.

CHAPTER 2: INCREASING PHYSICAL ACTIVITY AND DECREASING SEDENTARY BEHAVIOUR IN OLDER ADULTS: EXAMINING THE EFFECTS OF TRENDING NORMS ON INTENTIONS AND BEHAVIOUR

2.1 Methods

2.1.1. Participants

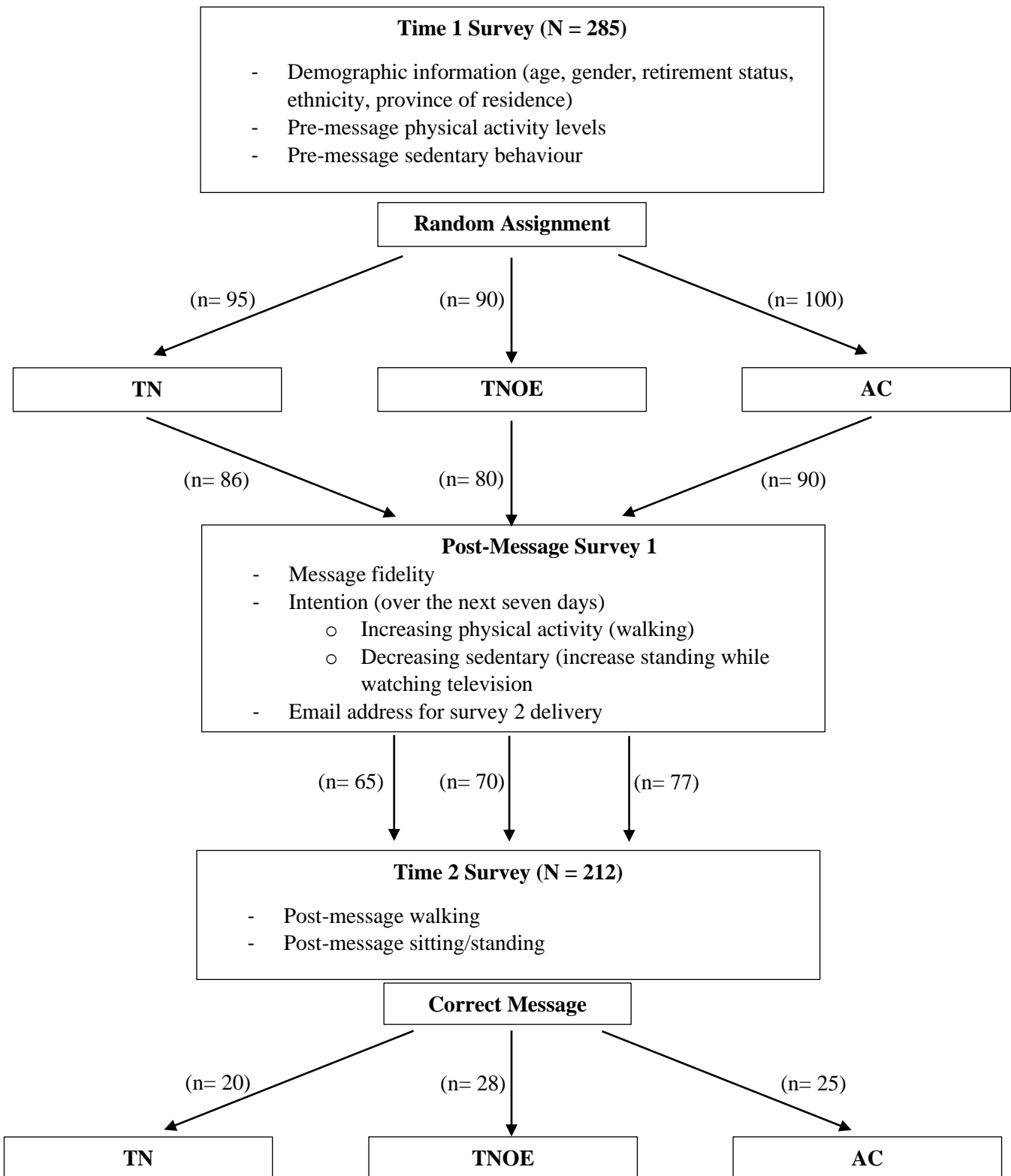
Older adults living in the Canadian prairie provinces ($N = 285$) were recruited to participate in this study (age range = 65-95 years, $M_{\text{age}} = 71.55$, $SD = 5.57$). Inclusion criteria involved being 65 years of age or older, currently retired and residing in Saskatchewan, Manitoba, or Alberta, able to safely stand and walk, read, and write independently, and reporting the use of a television at least once per week (rationale provided in a subsequent section for this inclusion criteria). Of the total sample, 60% of participants identified as women, 41% had completed a university or college degree, 93% identified as white, and 91% resided in Saskatchewan.

With respect to the total sample, participants were randomly assigned to one of three conditions: trending norm (TN, $n=95$), trending norm + outcome expectation (TNOE, $n = 90$), or attention control (AC, $n = 100$) and completed survey 1. Approximately 74% completed survey 2 with the condition distribution as follows: TN ($n = 65$, 68%), TNOE ($n = 70$, 78%), AC ($n = 77$, 77%). Of those completing both survey 1 and 2 ($n = 212$), only 34% were able to accurately recall the condition message received, and these were the individuals included in the analysis. This decision was made to provide a more accurate assessment of any differences attributed to the actual message content. This resulted in the following numbers used in the analysis: TN ($n = 20$, 31%), TNOE ($n = 28$, 40%), AC ($n = 25$, 36%). As noted, the percentages represent the number of participants completing both surveys who correctly recalled their message by

condition (see Fig 2.1 for flow of participants through survey 1 and 2). Of the final sample, 63% identified as women, 40% completed a university or college degree, 96% identified as white, and 90% resided in Saskatchewan.

Figure 2.1

Overview of Study Procedures and Participant Flow



2.1.2 Procedure

Following approval from the University of Saskatchewan's Behavioural Research Ethics Board (see Appendix A), participant recruitment began. Participants were recruited over a four-month period using a variety of methods. These included advertisements posted on social media (i.e., Facebook), prairie province organizations (Saskatchewan, Manitoba, Alberta) newsletters/e-newsletters/websites, as well as postings on local community bulletin boards. Participants also were recruited at community events at two locations in north-eastern Saskatchewan. All interested individuals who met the inclusion criteria were invited to participate in one of two ways. Participants could opt to complete an online study via a web link or complete paper questionnaires.

Participants were invited to complete two surveys over an 8-day period. Prior to completing survey 1, participants were invited to provide informed consent (see Appendix B). Questions in survey 1 (see Appendix C) requested demographic information (age, gender, retirement status, ethnicity, education, and province of residence) and self-reported physical activity (i.e., walking behaviour) as well as sedentary behaviour (i.e., sitting behaviours while watching television) on a typical day over the last seven days. Following collection of this information, participants were presented with one of three randomly assigned messages (TN, TNOE, AC, see Appendix D). After reading the message and answering fidelity questions (i.e., believability, persuasiveness, and whether the message was easy to understand), participants were asked about their intentions to increase physical activity and decrease their sedentary behaviour during the next seven days. Finally, participants were asked to provide the researchers with either an email (online survey) or address (paper questionnaires) to facilitate the delivery of survey 2.

Survey 2 was delivered to participants seven days following the completion of survey 1 (see Appendix E). After providing informed consent again, survey 2 was used to assess post-intervention physical activity and sedentary behaviours over the previous seven days. Survey 2 concluded with a manipulation check and a debrief of the true nature of the study (see Appendix F). Following the completion of survey 1 and 2, participants were invited to indicate whether they wished to be entered into a draw for a chance to win a 50-dollar-gift-certificate for food purchases at a vendor of their choice. Those participants who indicated yes were asked to include their email to ensure researchers could contact the draw winner.

2.1.2.1 Condition Specific Messages

Condition specific messages were created for the purpose of this study and contained statistics that would allow a test of the hypotheses (see Appendix D). In the TN condition, participants read the following message:

“Not being active enough and sitting too much appear to be the norm for retired adults in Canada. However, research conducted with retired adults in the Prairie Provinces has found that the number of **retired adults working to increase their walking while at the same time trying to reduce sitting behaviour** has *increased over the last few years*. Two years ago, the percentage was 19%, last year it was 24%, and this year it is **34% of retired adults doing both.**”

Those in the TNOE condition read this same message to which was added the following outcome expectation information:

“There are benefits to those making those changes as research reveals that many (around **91%**) of those who increase both their walking and decrease their sitting time, **even in small amounts**, show *improvements over time* in their fitness and health such as:

- improved ability to **perform daily activities**
- improved **bone and muscle strength**
- improved **cardiovascular system**
- improved **mental alertness**

- improved ability to **manage stress**”

Both messages (TN and TNOE) then concluded with a call to action encouraging participants to join others as has been done in previous norm/physical activity studies (e.g., Priebe & Spink, 2012). Suggestions noted by White et al. (2017) also were provided as to how this might be done:

“Join that steadily increasing number of retired individuals who are [improving their fitness and health by] (included in TNOE only) increasing their walking and reducing their sitting behaviour. Here are some ways they are doing this.

To increase walking, they are making small changes like building more **walking** into **daily tasks** that they already do such as:

- walking around more before entering stores and more when inside stores
- walking around the house when talking on the phone

To decrease sitting, they are disrupting their sitting time by **intentionally standing up** while **watching television. They are doing this** by making small changes such as:

- standing up to stretch during commercials
- standing up between shows”

The information in the messages was presented to participants using suggestions provided by McInnes and Haglund (2011) - use short sentences, plain language, avoid long lists, and use bullet points to increase the readability of health information. Further, seeing as the majority of older adults’ sedentary behaviour leisure time is spent in front of a screen (i.e., 85% of total sedentary time accounted for by television screen-based activities, Leask et al., 2015), two behaviours suggested by White and colleagues (2017) were used to interrupt sedentary behaviours - standing up to stretch during commercials and standing up between shows.

Regarding suggestions to be more active, walking was chosen because it is the most preferred type of physical activity for older adults (Amireault et al., 2019). As there are many

instances of walking behaviour, previous research (Davis et al., 2011) indicates that one potential avenue to increase walking among older adults is while shopping, as the most frequent trips reported for older adults to ‘get out and about’ involve shopping (33.2% of trips per week). Combining these two observations, walking around more before entering stores and more when inside stores was included as one activity to increase physical activity. Finally, socializing (e.g., talking on the telephone) is another common sedentary behaviour reported by older adults (Koltyn et al., 2019) and has been identified as one activity that could be used to reduce older adults’ sedentary time (Gardiner et al., 2011). Thus, walking around the house when talking on the phone also was presented as an opportunity to become more active.

2.1.3. Measures

2.1.3.1 Demographics

Demographic questions asked including age, gender, ethnicity, and highest level of education.

2.1.3.2 Current Physical Activity (Walking Behaviours)

Current walking behaviour was assessed using one item, ‘How much time did you spend walking to be active’. Walking was decided on as the operationalization of physical activity to get at this idea of saliency once again. Older adults have been reported to prefer walking at a light intensity (Amireault et al., 2019) for their daily physical activity. Therefore, by targeting and measuring walking specifically, the aim was to increase the saliency of the intervention. Responses were recorded in hours and minutes and were converted to total minutes for data analysis.

To facilitate recall for walking, event segmentation was used as previous research has suggested that questionnaires focusing on light activities, such as walking, may be subject to

high levels of recall bias due to the difficulty of conceptualizing and quantifying these activities as “physical activity” (Sallis et al., 2000; Schrack et al., 2016; Wild et al., 2016). Among older adults, it has been noted that event segmentation (i.e., an encoding strategy in which individuals break up continuous activity into meaningful chunks) is a promising avenue for enhancing older adults’ ability to remember activities (McGatlin et al., 2018). Thus, a segmented daily approach was used in this study where participants were asked to think of a “typical day” in the last seven days and indicate their walking behaviours in the morning (i.e., from the time you woke up – noon), afternoon (i.e., from noon – 6:00pm), and evening (i.e., 6:00pm until the time you went to bed). Responses were recorded in hours and minutes, converted to total minutes of walking for morning, afternoon and evening and then summed together for total minutes of walking/typical day for data analysis.

2.1.3.3 Current Sedentary Behaviours

Current sedentary behaviours were assessed using 3 items created for the purpose of this study. Like walking behaviours, assessment was segmented. Participants were asked about their television viewing in the morning (i.e., from the time you woke up – noon), afternoon (i.e., from noon – 6:00pm), and evening (i.e., 6:00pm until the time you went to bed). Sitting while watching television was the operationalization of sedentary behaviours given the current definition of sedentarism (Sedentary Behaviour Research Network, 2012) and the importance of targeting perceived passive sedentary behaviour (Palmer et al., 2018), as noted previously.

Using the morning segment as an example, participants were asked, “On that *typical day you identified*, how much time in the morning did you spend sitting watching television? (i.e., from the time you woke up – noon)”, “During that time *watching television* in the morning, how many times did you intentionally stand up to break up sitting too long? (i.e., not at all, 1x, etc.)”,

and finally, “What is the longest period of continuous sitting that you did at any one time while watching television during the morning of that day (i.e., the time between when you wake up – noon)?”. Sedentary behaviours while watching television were operationalized as total television viewing, intentionally standing, and continuous sitting while watching television over the day.

This sedentary construct split was modelled on the SITT formula developed by Tremblay et al. (2010) that includes time engaged in sedentary behaviour as well as attempts to interrupt sedentary behaviour. This classification also is consistent with the current Canadian sedentary guidelines for adults aged 65 years and older (Ross et al., 2020). Responses were recorded in hours and minutes, converted to total minutes for each of the daily segments, and summed for total minutes of sitting, frequency of sitting, interruption, and total time for continuous sitting while watching television/typical day for data analysis.

2.1.3.4 Intentions to Increase Physical Activity (Walking)

A 3-item measure was developed for this study to assess participants’ intention to increase their physical activity (i.e., walking). The measure was created using Ajzen’s (1991) guidelines for constructing intention measures. Participants were asked in three separate items, “I intend to/plan to/will likely increase my walking over the next seven days”. Responses were made on a 9-point Likert scale ranging from 1 (strongly disagree) to 9 (strongly agree).

2.1.3.5 Intentions to Decrease Sedentary Behaviour (Increase Standing)

A 3-item measure was developed for this study to assess participants’ intention to decrease their sedentary behaviour (i.e., increase frequency of their standing while watching television). Again, the measure was created using Ajzen’s (1991) guidelines for constructing intention measures. Participants were asked in three separate items, “I intend to/plan to/will

likely stand up more while watching television over the next seven days”. Responses were made on a 9-point Likert scale ranging from 1 (strongly disagree) to 9 (strongly agree).

2.1.3.6 Message Quality Check

Three message quality check questions were asked following the delivery of the condition specific messages (e.g., “The information in the message was... believable, persuasive, easy to understand”). Similar questions have been used in previous norm/physical activity research for fidelity checks (Anderson et al., 2022; Priebe & Spink, 2015). Responses for each question were recorded on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree).

2.1.3.7 Message Manipulation Check

As Festinger (1953) warned decades ago, researchers should not assume that the manipulation of variables is successful. Thus, manipulation checks should be used to check on the success of one’s manipulation. Therefore, in survey two, participants were asked, “Do you remember receiving a message in the last week about activities that older adults are starting to do more of now?”. If participants answered yes, they were then asked to identify the message they remembered receiving by selecting one of three options which resembled the overall theme of the message delivered in survey one. Option one depicted the trending norm with outcome expectation (e.g., “35% of retired adults are both walking and standing which has increased over the last three years and many (>90%) report health benefits associated with doing these two behaviours”), option two depicted the trending norm (e.g., “35% of retired adults are both walking and standing which has increased over the last three years”) and option three depicted the attention control (e.g., “An increasing number of retired adults are relieving their boredom by taking up a new hobby that is both enjoyable and meaningful”).

2.1.4. Data Analyses

Prior to testing the main analysis, all data were screened for outliers, missing values, and normality (Field, 2018).

2.1.4.1 Intentions

To test hypotheses examining intentions, a one-way MANOVA was used to examine the effects of the messages on reported post-message intentions to increase physical activity and decrease sedentary behaviour. In the case of a significant omnibus F test, one-way ANOVAs were performed to assess possible differences for physical activity and sedentary behaviour intentions. If significant differences emerged for either physical activity or sedentary behaviour intentions, pairwise comparisons using a Bonferroni correction were used to test for the specific condition-specific intention differences.

2.1.4.2 Behaviours

To test hypotheses examining behaviours, a one-way MANCOVA was used to examine the effects of the messages on reported post-message physical activity and sedentary behaviour, while controlling for pre-message physical activity and sedentary behaviour. Physical activity and sedentary behaviour were included as covariates in the main analysis given the strong relationship between the pre-intervention behaviour and post-intervention behaviour for both physical activity ($p < .001$) and sedentary behaviour ($p < .001$). Following a significant omnibus F test, one-way ANCOVAs would be performed to assess possible differences for physical activity and sedentary behaviour. If either outcome emerged as significant, pairwise comparisons using a Bonferroni correction would be used to test for the specific condition-specific behaviour differences.

2.1.4.3 Reliability

Cronbach's alphas were used to assess the reliability of each of the 3-item measures of intention.

2.4.1.4 Message quality check questions

The three message quality check questions were examined using a one-way MANOVA to assess whether the different condition messages differed in their perceived believability, persuasiveness, and understandability.

2.2 Results

2.2.1 Descriptive Statistics

Prior to the main analysis, all data used in the analyses ($n = 73$) were screened for incomplete responses, outliers, and normality using histograms and standardized scores (Field, 2018). Screening indicated that all responses were complete and subsequent normality checks were satisfactory. The distribution of participants across the three conditions was slightly different after removing participants who did not correctly identify the message (TN, $n = 20$, TNOE, $n = 28$, and AC, $n = 25$). The descriptive values across conditions are presented in Table 2.1.

Table 2.1*Descriptive by Condition*

	Total Sample (n=73)	TN (n=20)	TNOE (n=28)	AC (n=25)
Pre-message physical activity - walking ^a	95.0 ± 68.0	108.8 ± 77.6	98.2 ± 73.4	80.8 ± 51.7
Pre-message sedentary - sitting ^a	98.4 ± 88.4	99.8 ± 90.7	97.7 ± 90.0	98.0 ± 88.4
Pre-message sedentary – standing ^b	5.8 ± 6.6	4.6 ± 4.0	7.5 ± 9.4	5.0 ± 4.0
Age (years)	70.7 ± 5.7	72.3 ± 7.1	69.1 ± 4.0	71.3 ± 5.8
Gender				
Men	37%	30%	42.9%	36%
Women	63%	70%	57.1%	64%
Ethnicity				
White	95.9%	95%	96.4%	96%
Education				
High/secondary school	21.9%	25%	17.9%	24%
University/college degree	39.7%	30%	39.3%	48%
Graduate degree	13.7%	35%	25.0%	12%

^a Variables assessed in minutes^b Variables assessed in number of times per day**2.2.2. Reliability of intention measures**

Results from the Cronbach's alphas assessment revealed that both the physical activity ($\alpha = .95$) and sedentary behaviour ($\alpha = .96$) measures were internally consistent, so were deemed appropriate for use in the subsequent analysis. Given this strong internal consistency, the three items in each measure were averaged to create one measure for physical activity intention and

one for sedentary behaviour intention to be used in the analysis. Higher scores indicated a stronger intention for both measures.

2.2.3. Message Quality Check

A one-way MANOVA was used to test for differences between the messages on the three message quality variables. The MANOVA result was not significant, Wilk's lambda $F(6, 122) = 1.12, p = .35$, indicating message quality was similar across conditions. Overall, participants found the messages believable ($M = 6.0, SD = 1.1$), persuasive ($M = 5.6, SD = 1.2$) and easy to understand ($M = 6.2, SD = 1.1$) (see Table 2.2 for values by condition).

2.2.4. Main Analyses

2.2.4.1 Intentions

The results from a one-way MANOVA examining the effects of the messages on physical activity and sedentary behaviour intentions was significant, Wilks' Lambda, $F(4, 138) = 2.50, p = .045, \eta^2 = .07$, observed power = .70). Following the significant omnibus F test, one-way ANOVAs revealed that there was a significant difference among the condition messages for intention to decrease sedentary behaviour, $F(2, 70) = 4.03, p = .02, \eta^2 = .10$, observed power = .70). The results for the intention to increase physical activity approached significance, $F(2, 70) = 2.64, p = .08, \eta^2 = .07$, observed power = .51).

Table 2.2*Manipulation Check Means and Standard Deviations by Condition*

Condition	Manipulation Checks ^a		
	Believable	Persuasive	Easy to Understand
TN	6.0 ± .97	5.6 ± 1.2	6.1 ± .9
TNOE	6.2 ± .88	5.9 ± .9	6.4 ± .8
AC	5.8 ± 1.2	5.1 ± 1.3	6.0 ± 1.5

^a Variables assessed on a 1 to 7 scale

To test for condition-specific differences for the significant intention to decrease sedentary behaviour, results from pairwise comparisons (Bonferroni correction) revealed that those receiving the trending norm plus outcome expectation (TNOE) reported a stronger intention to decrease sedentary behaviour than those receiving the attention control message (AC) ($p = .04$) (see Table 2.3 for estimated marginal means by condition). While those receiving the trending message by itself (TN) also reported stronger intentions to increase physical activity than those receiving the attention control (AC) message, the difference only approached significance ($p = .07$). These differences are illustrated in Figure 2.2. No other differences were significant.

2.2.4.2 Behaviours

Results from the MANCOVA, controlling for pre-message physical activity and sedentary behaviours, revealed no main effect for messages, Wilks's lambda $F(4, 84) = .42, p = .79, \eta_p^2 = .02$ so no further analyses were conducted (see Table 2.3 for estimated marginal means by condition).

Table 2.3

Estimated Marginal Means and Standard Deviations for Post Message Physical Activity and Sedentary Behaviours and Intention

	Condition		
	TN	TNOE	AC
Physical activity - walking ^a	121.18 ± 83.22	94.44 ± 91.2	90.96 ± 58.64
Sedentary - standing ^b	5.17 ± 4.69	6.29 ± 5.18	4.79 ± 3.08
Sedentary - continuous sitting ^a	98.23 ± 70.27	91.85 ± 84.38	101.87 ± 88.37
Physical activity intention ^c	6.53 ± 1.98	5.79 ± 2.15	5.00 ± 2.30
Sedentary intention ^c	5.98 ± 2.41	6.00 ± 1.84*	4.55 ± 1.97*

Note. Physical activity – walking assessed as total minutes of walking to be active/typical day; Sedentary – standing assessed as total times participant stood up while watching television/typical day; Sedentary – continuous sitting assessed as total minutes/typical day of continuous sitting while watching television

^a assessed in minutes

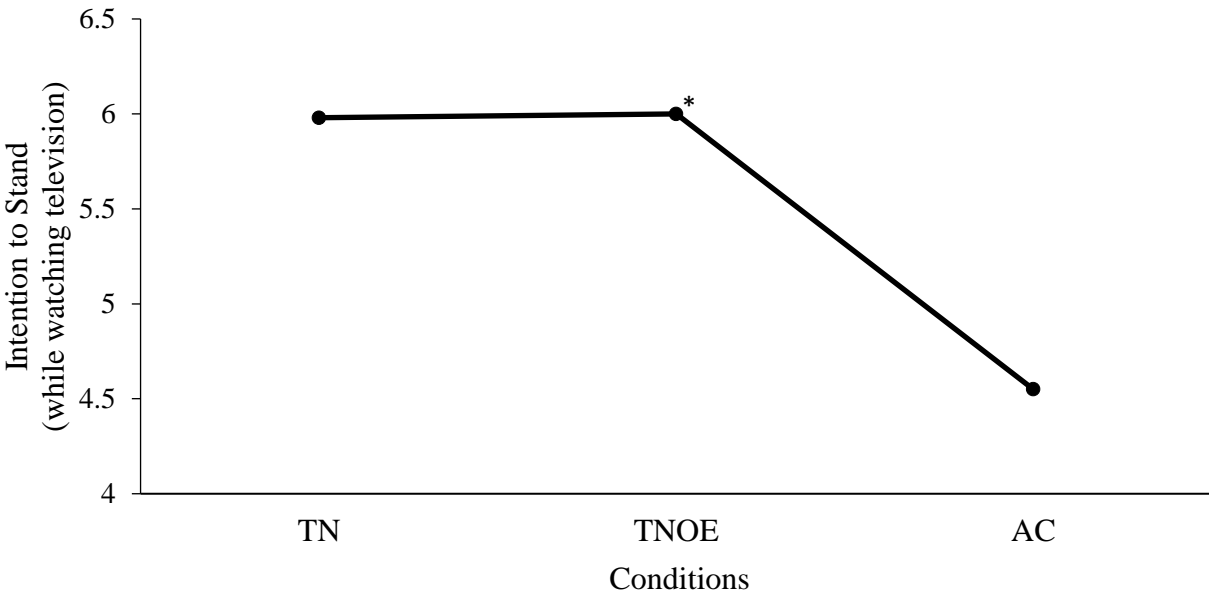
^b assessed in number of times per day

^c assessed on a 1 to 7 scale

* $p = .03$.

Figure 2.2

Intentions to Reduce Sedentary Behaviours by Standing More by Condition



Note: Intentions to stand more rated on a 1-7 scale
* Significantly different than AC, $p = .03$

2.3 Discussion

The main purpose of this study was to examine the effects of trending descriptive norm messages with or without positive outcome inducements on older adults' intentions and self-reported behaviours to increase their physical activity (i.e., walking) and decrease their sedentary behaviour (i.e., standing to break up sitting). Of all the relationships examined, one significant result emerged. Those older adults exposed to the trending norm paired with outcome expectation message reported a greater intention to reduce sedentary behaviour by increasing their standing compared to those receiving the attention control message.

The finding that a type of descriptive norm message coupled with a positive outcome expectation impacted sedentary behaviour intentions parallels results found in physical activity research. Previous findings revealed that those exposed to a descriptive norm paired with a high positive outcome expectation message reported greater physical activity behaviour (Crozier & Spink, 2017). Further, the fact that a trending descriptive norm was effective extends previous research findings that trending norms could decrease on-campus sedentary behaviour by standing more in university students (Anderson et al., 2022) to the older adult population.

While the extension of trending norm messages to the older adult population is promising, three important questions are raised from the results that were expected in this study but did not emerge. First, why were intentions only affected by the message in the trending norm/positive outcome expectation condition (TNOE) and not the solo trending norm condition (TN)? Second, why was there a significant effect of the TNOE message on decreasing sedentary behaviour intention but not on intention to increase physical activity? Third, why did participants report an intention to decrease sedentary behaviour but did not report an attendant change in

sedentary behaviour? Suggestions for possible answers to these three questions follow in the subsequent paragraphs.

2.3.1 Differing Intentions by Condition

Older adults in this study reported significantly greater intentions to reduce their sedentary behaviour when exposed to a trending norm message that was paired with a positive outcome expectation, but not when the positive outcome expectation was absent. The finding that descriptive norms coupled with a positive outcome expectation impacted intentions clearly aligns with focus theory (Cialdini et al., 1990). As outlined in the theory, norms should motivate behaviour when they are activated (i.e., salient). Consistent with previous physical activity/norm research (Crozier & Spink, 2017), it was assumed and found in the current study that activity outcomes (in this study, intention to decrease sedentary emerged) would be influenced by normative information made salient by a positive outcome expectation. While reassuring, this also begs the question as to why the normative message by itself was not salient enough to induce change consistent with the message as has been found in other social norm/physical activity/sedentary research studies (e.g., Priebe & Spink, 2015). Two possible explanations emerge here.

First, as trending norms indicate a minority of individuals are engaging in a behaviour, it is plausible that an inducement is needed to make the information salient enough to act on. In the current study, positive outcome expectations were used as the inducement indicating why individuals are now starting to change their behaviour, thus making the information more salient. Second, it is possible that the failure of the TN condition to emerge as different from the control may reside not within a conceptual argument, but rather, with the statistical assumptions framing this study.

By way of explanation, this study used the conventional .05 level as the maximum acceptable probability to claim statistical significance. While the TN condition was not significant, it is worth recognizing that adhering to the conventional .05 level does not eliminate the possibility that a meaningful relationship is not present for the relationships that did not emerge as significant in this study. Reasons supporting this suggestion follow. First, it has been argued that if one is exploring a new set of relationships, a larger error may be more appropriate to guard against Type 2 error (e.g., .10, Labovitz, 1968). Second, given the inherent variability often found in field studies, they often lack the power to detect statistically significant differences at the conventional .05 level (Sutlive & Ulrich, 1998).

Given this was a field study examining a new set of relationships, observed power was lower (70%), and the p value was .07, it could be argued that a meaningful difference also existed between the TN condition and the control. The fact that estimated marginal mean values of the TNOE and the TN message conditions (see Table 2) were very similar (only differed by around 0.12) also is consistent with the suggestion that the TNOE and TN condition may have been both meaningfully different than the control condition. To test this suggestion, future research should replicate and extend the current findings with a larger sample size to increase power to observe whether trending norms also could significantly influence older adults' intentions to reduce sedentary by standing more without the need to add a positive outcome expectation.

2.3.2 Differences between Intentions to Reduce Sedentary and Increase Physical Activity

The fact that differences emerged for reducing sedentary (i.e., by standing up more) but not physical activity (i.e., more walking) intentions also deserves comment. It is worth noting that the current results support suggestions by Koltyn and colleagues (2019) that breaking up

sitting time would be more appealing to older adults than attempts to increase physical activity. Also, with respect to trending norms, the results of this study are in line with previous findings among university students where it was found that exposure to trending norms affected decreasing sedentary behaviour by increasing on-campus standing behaviour but not increasing on-campus physical activity (Anderson et al., 2022).

The relationship between trending norm messages and increasing physical activity intentions was not significant at the conventional .05 level. However, given this was a field study examining new relationships and the obtained p value was .08, concluding that trending norms do not influence older adults' intention to walk also might be premature at this time. This may be particularly relevant given that the values of the trending norm conditions, TNOE (5.79 ± 2.15) and TN (6.53 ± 1.98), were both noticeably higher than the AC condition (5.00 ± 2.30). Future research using larger samples should continue to examine the effects of trending norms on both reducing sedentary and increasing physical activity behaviours to determine whether trending norms can increase the physical activity of older adults as well.

2.3.3 Differences between Intentions and Reported Behaviours

The theoretical framework for this study (focus theory, Cialdini et al., 1990) does not entertain any relationship between intention and behaviour. However, one of the more interesting questions emanating from these findings concerns why participants in the TNOE condition reported greater intentions to reduce their sedentary but did not change their behaviour to match this intention. While unexpected, in hindsight, this finding may not be surprising. Examination of previous research in numerous areas reveal that there have been many studies finding changes in intentions, without an accompanying change in behaviour. In fact, there have been so many

reporting this pattern that this observation has been given a name, the intention-behaviour gap (i.e., those with positive intentions who fail to perform the behaviour, Sheeran, 2002).

Several reasons have been forwarded to explain why intention may not always translate into behaviour that could apply to the present findings. Sedentary behaviour in this study was operationalized as sitting behaviour. Given the habitual nature of sitting and the suggestion that habitual behaviour often bypasses intentional control (Ouellette & Wood, 1998), one construct that could have affected the results in the current study is habit strength.

In health psychology, a habit is considered a phenomenon through which behaviour is elicited automatically by situational cues, resulting from learned cue-behaviour associations and repetition (Wood & R nger, 2016). Given that older adults engage in approximately 10 hours of sedentary behaviours/day (e.g., regularly repeated), 2.5-3.6 hours of which is spent watching television (Prince et al., 2020), few would argue with the classification of sitting as a habit. In this study, older adults averaged 3.4 hours/typical day of television, making this sample very typical. Although participants in this study were not asked if television viewing was habitual for them, results from previous qualitative research indicate that older adults themselves often identify sedentary behaviour as habitual (Compernelle et al., 2020).

Given these observations, it is possible that participants in the current study possessed a relatively strong habit surrounding their sitting behaviours, which may have impacted the influence of the trending norm on reported behaviour. As habit strength was not assessed and has not been considered in social norms research, this is conjecture at this point. Given the suggestion that health behaviour that is habitual may be under less motivational control (Di Maio et al., 2021), future research may wish to examine older adults' habit strength in relation to their sitting behaviours as a potential moderator.

In this study, decreasing sedentary also was linked to a specific context (i.e., sitting while watching television). Palmer and colleagues' (2018) examination of older adults' sitting behaviours concluded that many sedentary activities are embedded in older adults' lives as part of their daily temporal routines, including television viewing. As such, these behaviours may be difficult to change. Further, Palmer and colleagues (2018) noted that most participants described such temporal patterns of sitting as a way of managing their physical function and as a reward for completing non-sitting activities earlier in the day. As such, the authors posited that it might be more effective to encourage this population to think about ways to break up long periods of passive sitting with non-sitting activities, such as doing some typical sitting activities while standing up (e.g., standing up while talking on the phone). Talking on the phone was identified as a typical sitting activity that can be performed standing up by some older adults themselves in another study (Palmer et al., 2018). Therefore, targeting and assessing a behaviour that is not embedded in routine may serve to reduce the intention-behaviour gap.

Another possible factor that might explain the intention-behaviour gap observed in this study concerns self-regulation. Self-regulation refers to individuals managing control over themselves to regularly achieve a desired outcome (e.g., decreasing sedentary by standing while watching television) (Bandura, 1986; Baumeister & Heatherton, 1996). According to self-regulation research, one of the most important triggers of self-regulation failure is a loss of control of attention and one particularly important form of attention control is transcendence (Baumeister & Heatherton, 1996). Transcendence is a matter of focusing awareness beyond the immediate stimuli. When attention is no longer focused on objectives (e.g., increasing standing during television watching) and instead becomes focused on the immediate situation (e.g., television content), self-regulation is jeopardized (Baumeister & Heatherton, 1996).

Based on unsolicited participant comments, this may have been a consideration in the current study. During data collection, several participants mentioned to the researcher that they were watching more television and even reported feeling “obligated” to watch for hours at a time due to ongoing global events. Of note, the highest peak of participant completion of survey 1 and 2 occurred from March 4, 2022, to March 21, 2022 (i.e., 48% of all participants completed survey 1 on March 4, 2022). According to television-viewing data, in March of 2022 audiences spent more time watching cable, and trends from the United States indicate that the ongoing war in Ukraine fueled an increase of 1.5% in total volume of cable viewing (Nielson, 2022). When analyzing the top television programs across Canada in March 2022, one can infer a similar trend. For example, when comparing average minute audience (AMA; the estimated average number of people who viewed/listened to a program during an average minute within a specified time (usually expressed in thousands) of news programs in January versus March, there was a 2.2% increase in AMA, indicating an increase in viewership (Numeris, 2022). As a result, such unprecedented events during the time of data collection may have caused participants to focus on the immediate situation (e.g., televised images/accounts of war), thereby jeopardizing self-regulation with respect to being more active and less sedentary, leading to a lack of behaviour change.

Watching ‘unprecedented’ events during television viewing also may relate to Palmer and colleagues’ (2018) findings regarding the importance of distinguishing between passive and purposeful behaviour. They concluded that sitting activities during daily routines associated with cognitive, social, and/or restorative benefits would be difficult to change. Therefore, it is possible that participants in the current study viewed their television watching during this time as a high value/ “purposeful” activity due to the nature of the unfolding world events. Future research

examining increased standing/decreased sitting while watching television might want to distinguish between passive and purposeful activities. Further, within the normative conditions, perhaps future research could target passive behaviours more specifically within the trending norm message (e.g., further distinguishing standing activities such as standing when “not watching anything of interest” as suggested by Palmer et al., 2018).

When considering reasons for the intention-behaviour gap within the physical activity/sedentarism realm found in this study, another possibility emerges – self-efficacy (Sniehotta et al., 2005). According to Bandura (1997), perceived self-efficacy involves an individual’s perception of one’s ability to perform a specific behaviour to produce a desired outcome. One’s intention to engage in a behaviour may not be realized if one is not efficacious. Previous research has supported this conclusion in that those individuals who report being efficacious are more likely to translate their intentions into action than those individuals who are lower in self-efficacy (Lippke, 2009; Rhodes et al., 2008; Rhodes & Dickau, 2013).

It is possible that participants in the current study possessed lower self-efficacy. Although they may have had an intention to decrease their sedentary behaviour, they may not have had the confidence that they could overcome the habitual behaviour of sitting (Prince et al., 2020) by standing up while watching television. As support for this supposition, older adults have reported that fatigue and symptoms due to chronic illnesses were significant barriers to decreasing sedentary behaviour (Greenwood-Hickman et al., 2016). Given these barriers could reduce efficacy, this could provide another possible reason why intention to reduce sedentary behaviour did not translate into an actual behaviour change. As self-efficacy was not assessed in the current study, this suggestion remains speculative, and future research should consider examining barrier self-efficacy as a potential moderator in the intention/behaviour relationship.

Considering the possible relationship of self-efficacy with the intention-behaviour relationship, another important construct presents itself – action planning. Action planning, or implementation intention, is captured in the idea that one is going to make intentions specific by linking the behaviour to a cue in the environment. This is often identified as an ‘if-then’ plan (e.g., specifying when, where, and how the person will instigate responses) (Gollwitzer & Sheeran, 2006). Implementation intention also has been identified as a possible mediator in the intention-behaviour relationship. If an individual reports an intention to perform a behaviour (e.g., standing when watching television), and they make that intention specific, there is a greater chance that the individual will perform the behaviour (Carraro & Gaudrea, 2013). Further, if self-efficacy is greater, the probability that their action planning will translate into a behaviour will increase significantly (Di Maio et al., 2021). More specifically, those higher in self-efficacy are better able to translate their action planning into a behaviour because these individuals may invest more effort into enacting their plan (Di Maio et al., 2021).

Gollwitzer and Sheeran (2006) indicate that to form an implementation intention, the individual must first identify a response that will promote goal attainment and second, anticipate when they will initiate the response. This protocol was part of the trending norms messaging in this study where the goal was to stand up while watching television by either standing up to stretch (how) during commercials (when) or by standing up (how) between shows (when). However, it is possible that this call to action in the current study was undermined by a lack of efficacy. As noted above, self-efficacy may have been lower due to presenting barriers (e.g., fatigue or habit). Thus, even if action planning was strong, a lower self-efficacy could have weakened the intention-behaviour relationship.

2.3.4 Limitations and Future Directions

Although the results of this study are informative, like most field studies, the study is not without limitations. First, it is worth noting that many participants could not recall the received message, thus calling into question the fidelity of the intervention. Of the 212 participants who completed the survey 2 manipulation check question, only 34% correctly identified the message they were delivered one week later. While this is not unique to this study, as other norm/physical activity studies have reported similar delivery/receipt of message issues (e.g., Priebe & Spink, 2015), future research examining older adults should attempt to create trending norm messages that are easier to remember.

Given the suggestion that recall improves with repetition (Cacioppo & Petty, 1979), one obvious solution might be to increase the frequency of message delivery. Messages might be easier to remember if they are delivered on multiple occasions versus the one-time exposure used in the current study. In terms of another possible message improvement suggestion, previous research examining the effectiveness of health education publications among older adults recommend that to account for age-related visual changes and generational word usage/comprehension, material should be printed in bold 20-point serif font while strategically underlining/highlighting to emphasize the primary message(s) and enhance readability (Orel et al., 2005). Although the current study used printed material in serif font and strategically highlighted text by bolding primary phrases of the message (e.g., “**Join that steadily increasing number of retired individuals**”), a 12-point font size was used. It is possible, therefore, that the message text in this study was too small for some participants and decreased readability.

Further, it has been recommended that to complement textual messages (as applied in this study), images of older adults and other reinforcing visuals are needed (Orel et al., 2005). Perhaps future research may want to deliver trending normative messages in a larger font paired

with images as a possible way to improve message recall by enhancing readability and comprehension. However, caution should be applied if pairing images with text depicting a trending norm as the image may act as a moderator itself in the trending norm/intention relationship by acting as a separate cue to action through the depiction of similar others engaging in a behaviour (as proposed by Koeneman et al., 2017).

In hindsight, another possible limitation of the current study may relate to seasonality. This study was conducted in the winter. Previous research has established a clear relationship between weather and physical activity among older adults (Aspvik et al., 2018; Jones et al., 2017). More specifically, older adults are more likely to engage in physical activity behaviours with higher daytime peak temperatures and lower humidity (Jones et al., 2017).

Among older adults residing in rural Canada, previous qualitative research also indicates that the most common perceived environmental barrier to engaging in physical activity was the fear of falling, which is heightened during the winter months (Schmidt et al., 2016). This may have been particularly relevant in this study as data collection occurred during ice, freezing, and storms in Saskatchewan (Ratzlaff, 2022). Considering that 90% of the study sample was from Saskatchewan, the weather conditions during the data collection period may have played a considerable role in trying to increase walking behaviours.

Previous research examining the effectiveness of physical activity interventions during different seasons among adults also has found that physical activity interventions were more effective in the summer than in the winter (Welch et al., 2018). Further, results from a recent study revealed that weather conditions associated with seasonal change moderated the relationship between a cognitive predictor and physical activity levels (Wilson & Spink, 2020). Therefore, future research may wish to consider conducting social norm interventions across the

seasons to account for the possible moderating effect of weather on physical activity behaviour. Last, the participants in this study were primarily well educated, white, women. To extend generalizability of the results, more diversity should be included in the sample (e.g., more non-white individuals, men, lower education levels) to see if the current relationships still hold.

2.3.5 Strengths

Despite these limitations, this study also had several strengths. The results provide preliminary evidence that trending norms may be a means to address the norm of sedentary behaviour among the older adult population. Older adults state that sedentary behaviours are entrenched within their lifestyle and are often habitual in nature (Compernelle, 2020; McGowan et al., 2019). If the current results can be replicated, providing older adults with a trending norm message paired with an outcome expectation depicting that more retired adults are increasing their standing and decreasing their sitting may serve to counter such habitual behaviours by providing specific cues that serve to increase intentions to reduce sedentary behaviour.

A second strength of the current study includes its experimental design, which allows one to infer a possible cause-and-effect relationship. Further, this study adds to previous research in two ways. First, the results extend the findings for the use of social norms to older adults (Koeneman et al., 2017) by applying trending norms with a theoretical underpinning (i.e., focus theory, Ciladini et al., 1990). Second, these results extend the findings of trending norms influencing sedentarism among university students (Anderson et al., 2022) to older adults.

This study also assessed both sedentary and physical activity intentions and behaviours in the same intervention. The current study was, to my knowledge, the first to apply a normative intervention relating to both sedentarism and physical activity together. While the results were mixed, it is important for future research to continue to target and intervene on both behaviours

considering the negative health consequences and independent effects of both sedentary behaviour and physical inactivity on health (Ekelund et al., 2016).

One suggestion moving forward might be to distinctly differentiate between sedentary and physical activity behaviours and their attendant benefits within the trending norm message. The current intervention attempted this by stating, "...working to increase their walking while at the same time trying to reduce sitting behaviour". However, the benefits of such behaviours were grouped together (e.g., improved ability to perform daily activities due to both increasing physical activity and decreasing sedentary). Future research may wish to use messages that highlight the independent health benefits of engaging in less sedentary behaviour and more light-intensity activities. This might be particularly important given that many older adults perceive reducing sedentary behaviour and increasing activity (e.g., MVPA) to be the same thing (McGowan et al., 2021). Consequently, assigning benefits separately to each may be more effective in getting older adults to engage in both behaviours.

2.4 Conclusion

Given that increasing physical activity and decreasing sedentary behaviours are two of the most important steps older adults in Canada can take toward improving health (Canadian Medical Association, 2013; Ross et al., 2020), understanding ways to intervene with these behaviours is worthwhile. The current study adds to existing physical activity and sedentary interventions (e.g., goal setting, support consultations, education booklets; Copeland et al., 2017; Taylor et al., 2021; White et al., 2017) by examining a potential cost-effective and efficient means to target physical inactivity and sedentarism using trending norm messages. Although significant results were only found for intention to decrease sedentary behaviour using a trending norm paired with outcome expectation message, trending norm researchers are encouraged to

improve upon these results by addressing the limitations outlined in this study with a view to decreasing sedentary while increasing physical activity in older adults.

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Appendix A: Ethical Approval and Amendment Certificate



Behavioural Research Ethics Board (Beh-REB) 31-Mar-2022

Certificate of Approval Amendment

Application ID: 3093

Principal Investigator: Kevin Spink

Department: College of Kinesiology

Locations Where Research

Activities are Conducted: Retirement communities in Saskatoon, SK including Preston Park II, The Village at Stonebridge, Luther Tower, and senior facilities including the YWCA Retirement community in Tisdale, SK including Caleb Village Online via SurveyMonkey, Canada
Nipawin Evergreen/Nipawin Lions Trade Show, Canada
Tisdale Rec Plex/Tisdale Ramblers Rodeo, Canada

Student(s): Karly Anderson

Funder(s):

Sponsor: University of Saskatchewan

Title: An Examination of the Lifestyle Activities of Retired Adults

Approved On: 31-Mar-2022

Expiry Date: 24-Jan-2023

Approval Of: Behavioural Amendment Form: 30-Mar-2022

New sites added

Acknowledgment Of:

Review Type: Delegated Review

CERTIFICATION

The University of Saskatchewan Behavioural Research Ethics Board (Beh-REB) is constituted and operates in accordance with the current version of the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TPCS 2 2018). The University of Saskatchewan Behavioural Research Ethics Board has reviewed the above-named project. The proposal was found to be acceptable on ethical grounds. The principal investigator has the responsibility for any other administrative or regulatory approvals that may pertain to this project, and for ensuring that the authorized project is carried out according to the conditions outlined in the original protocol submitted for ethics review. This Certificate of Approval is valid for the above time period provided there is no change in experimental protocol or consent process or documents.

Any significant changes to your proposed method, or your consent and recruitment procedures should be reported to the Chair for Research Ethics Board consideration in advance of its implementation.

ONGOING REVIEW REQUIREMENTS

In order to receive annual renewal, a status report must be submitted to the REB Chair for Board consideration within one month prior to the current expiry date each year the project remains open, and upon project completion. Please refer to the following website for further instructions: <https://vpresearch.usask.ca/researchers/forms.php>.

Digitally Approved on behalf of the Chair
Behavioural Research Ethics Board
University of Saskatchewan

1 / 1



Behavioural Research Ethics Board (Beh-REB) 25-Jan-2022

Certificate of Approval

Application ID: 3093

Principal Investigator: Kevin Spink

Department: College of Kinesiology

Locations Where Research

Activities are Conducted: Retirement communities in Saskatoon, SK including Preston Park II, The Village at Stonebridge, Luther Tower, and senior facilities including the YWCA Retirement community in Tisdale, SK including Caleb Village Online via SurveyMonkey, Canada

Student(s): Karly Anderson

Funder(s):

Sponsor: University of Saskatchewan

Title: An Examination of the Lifestyle Activities of Retired Adults

Approved On: 24-Jan-2022

Expiry Date: 24-Jan-2023

Approval Of: Behavioural Ethics Application

Covid-19 Safety Plan & associated signage

In-Person Consent Form

Online Consent Form

Survey materials, 1 and 2

Normative Messages

Recruitment posters

Recruitment correspondence with facilities and organizations

Debriefing form

Acknowledgment Of: Participation and confirmation for site access: LutherCare Communities- Luther Tower, Preston Park 2, LutherCare Communities- The Village at Stonebridge, YWC Saskatoon, Caleb Village

TCPS2 CORE Certificate: Karly Anderson

Review Type: Delegated Review

1 / 2

Participant Consent Form –Mailed

You are invited to participate in a research study entitled: An Examination of the Lifestyle Activities of Retired Adults

Principal Investigator/Supervisor: Dr. Kevin S. Spink, Supervisor, College of Kinesiology, University of Saskatchewan, tel:+(306) 966-1074, kevin.spink@usask.ca

Student Researcher(s): Karly J. Anderson, graduate student, College of Kinesiology, University of Saskatchewan, karly.anderson@usask.ca

Purpose and Objective of the Research:

- We are interested in examining two lifestyle activities performed by retired adults. Specifically, walking and watching television.
- Results of this project will showcase specific behaviours being performed by retired adults to better inform researchers of this population's lifestyle activities.

Who can participate in this research:

- For the purpose of this research, we ask that participants must:
 - Be currently retired
 - Be over the age of 65
 - Report having access to and use of a television at least once per week
 - Can read and write independently
 - Be ambulatory

Procedures:

- This study will be conducted using paper questionnaires delivered to your address. Your participation will involve responding to two brief surveys about yourself, including information regarding walking and television watching behaviours throughout the day and your beliefs associated with the behaviours.
- Your participation in this study is entirely voluntary. If you wish to participate, you will be asked to agree to a consent question at the bottom of this document. You are free to withdraw at any time and without giving reason for your decision. Please read this document carefully and feel free to contact either of the researchers listed above with questions you may have about the study or your involvement.
- The first survey is expected to take a maximum of 10 minutes. Seven days after the completion of the first survey, researchers will deliver survey 2 to your address inviting you to complete a second survey (approximately 8 minutes to complete)

Funded by:

- This research is not funded. The researchers report no conflict of interest.

Potential Risks:

- There are no known or anticipated risks to you by participating in this research.

Potential Benefits:

- There are no personal benefits to participation in this study, although findings from this study will help exercise researchers to better understand retired adults walking and television watching behaviours. As a participant, you may be making important contributions to the research literature.

Compensation:

- All participants, regardless of completion of the project, will have the chance to provide their contact information (email/phone number) for a chance to win a \$50 dollar gift card for a local food business.
- Your contact information will remain separate from your data to maintain confidentiality of your data.

Confidentiality:

- Data will be disseminated in a thesis to meet the requirements of the Master's program and may be presented at conferences and in articles.
- Participant consent forms will be stored separately from the data and locked in a filing cabinet in Dr. Kevin Spink's office and will not be accessible by anyone other than the principal investigator. Once the survey is complete, all consent forms will be shredded.
- Although the data from this research project may be published and presented at conferences, the data will be reported in aggregate form so that it will not be possible to identify individuals.
- As you will complete surveys at two time points, it will be necessary to connect your name to both surveys. To ensure confidentiality, individual names will be replaced with an identification number before information is entered into the computer database. A master list of participant names and identification numbers will be stored separately from the questionnaires and the database.
- As this survey will be delivered to your address, it will be necessary to ask your address following survey 1. Your address will be used by the student researcher only to hand-deliver the second survey to your address. Your address will not be transferred to a computer database and will be shredded following the delivery of survey 2.
- Following the completion of survey 2, the final page of both survey 1 and 2 will be removed and shredded. As individual names will be replaced by an ID number, it will not be possible to associate a name with any given information of the questionnaire except through the master list.
- The data will be stored in a locked filing cabinet in Dr. Kevin Spink's office and will not be accessible by anyone other than the principal investigator. The master list will be destroyed on May 1, 2022.

- Only the researchers will have access to the data. No data will be stored on any computer hard drives once the study is complete. Survey data will be transferred to electronic data and will be stored by the Principal Investigator on OneDrive. Data will be shared with the student researcher securely through Microsoft OneDrive.
- The data will be stored for a minimum of five years post-publication. If the researcher chooses to destroy the data after the five years, it will be destroyed beyond recovery. This is standard protocol for any data that may be published in an academic journal or presented at a professional conference.

Right to Withdraw:

- Participation in this survey is voluntary.
- You can decide not to participate at any time by returning the questionnaire or choose not to answer any questions you do not feel comfortable answering. Survey responses will remain confidential. If you withdraw from the study before survey completion, any data that you have contributed will be destroyed.
- Your right to withdraw data from the study will apply until April 30, 2022. After this, it is possible that some form of research dissemination will have already occurred, and it may not be possible to withdraw your data.
- By signing this document, you do not waive any of your legal rights.

Follow up:

- To obtain results from the study, please send an email request to the principal investigator (kevin.spink@usask.ca) or student researcher (karly.anderson@usask.ca).
- Results are expected to be completed no later than May 30, 2022.

Questions or Concerns:

- Contact the researcher(s) using the information at the top of page 1.
- This research project has been approved on ethical grounds by the University of Saskatchewan Behavioural Research Ethics Board. Any questions regarding your rights as a participant may be addressed to that committee through the Research Ethics Office: ethics.office@usask.ca; 306-966-2975; out of town participants may call toll free 1-888-966-2975.

CONSENT TO PARTICIPATE

STUDY TITLE: An Examination of the Lifestyle Activities of Retired Adults

I have read, or someone has read to me, the information in this consent form.

I understand the purpose and procedures, and the possible risks and benefits of the study.

I was given sufficient time to think about the study and my participation.

I had the opportunity to ask questions and have received satisfactory answers.

I understand that I am free to withdraw from this study at any time for any reason and the decision to discontinue will not affect my relationship with the principal investigator, the research student, the College of Kinesiology, or the University of Saskatchewan.

I give permission to the use and disclosure of my de-identified information collected for the

research purposes described in this form.

By agreeing to participate in this study I do not waive any of my legal rights.

Your signature below indicates that you have read and understand the description provided. I have had an opportunity to ask questions and my questions have been answered. I consent to participate in the research project. A copy of this consent form has been offered to me for my records.

Name of Participant

Signature

Date

Researcher's Signature

Date

If you would like a copy of this consent form for your own records, please contact the student researcher, Karly Anderson via email or phone.

Karly.anderson@usask.ca

1-306-812-7881

Participant Consent Form - Online

You are invited to participate in a research study entitled: An Examination of the Lifestyle Activities of Retired Adults

Principal Investigator/Supervisor: Dr. Kevin S. Spink, Supervisor, College of Kinesiology, University of Saskatchewan, tel:+(306) 966-1074, kevin.spink@usask.ca

Student Researcher(s): Karly J. Anderson, graduate student, College of Kinesiology, University of Saskatchewan, karly.anderson@usask.ca

Purpose and Objective of the Research:

- We are interested in examining two lifestyle activities performed by retired adults. Specifically, walking and watching television.
- Results of this project will showcase specific behaviours being performed by retired adults to better inform researchers of this population's lifestyle activities.

Who can Participate in this Research:

- For the purpose of this research, we ask that participants must:
 - Be currently retired
 - Be over the age of 65
 - Report having access to and use of a television at least once per week
 - Can read and write independently
 - Be ambulatory

Procedures:

- This study will be conducted online. Your participation will involve responding to two brief surveys about yourself, including information regarding walking and television watching behaviours throughout the day, and your beliefs associated with the behaviours.
- Your participation in this study is entirely voluntary. If you wish to participate, you will be asked to agree to a consent question at the bottom of this page. You are free to withdraw at any time and without giving a reason for your decision. Please read this document carefully and feel free to contact either of the researchers listed above with questions you may have about the study or your involvement.
- The first online survey is expected to take a maximum of 10 minutes. Seven days after the completion of the first survey, you will receive the second online survey (approximately 8 minutes to complete)

Funded by:

- This research is not funded. The researchers report no conflict of interest.

Potential Risks:

- There are no known or anticipated risks to you by participating in this research.

Potential Benefits:

- There are no personal benefits to participation in this study, although findings from this study will help exercise researchers to better understand retired adults walking and television watching behaviours. As a participant, you may be making important contributions to the research literature.

Compensation:

- All participants, regardless of completion of the project, will have the chance to provide their contact information (email/phone number) for a chance to win a \$50 dollar gift card for a local food business.
- Your contact information will remain separate from your data to maintain confidentiality of your data.

Confidentiality:

- As you will be asked to complete two surveys at two time points, and contacted via email, it will be necessary to connect your name with your email address. To ensure confidentiality, individual names will be replaced with an identification number before information is entered on to the principal investigator's OneDrive. A master list of participant names and identification numbers will be stored on a separate OneDrive file on the principal investigator's USask OneDrive university account.
- Written reports of the results will be expressed in an aggregate/summarized form so that it will not be possible to identify individuals. When published or presented at conferences, the data will be reported in a summarized form so that it will not be possible to identify responses from individual participants.
- All survey information will be retained and hosted on a third party, SurveyMonkey server and not on a U of S server. Your data will be stored in facilities hosted in Canada. Your information is subject to SurveyMonkey's Privacy Policy. (<https://www.surveymonkey.com/mp/policy/canadian-data-centre-overview/>) **The privacy of the information that you provide is subject to the laws of those other jurisdictions and by participating in this survey you acknowledge and agree that your information will be stored and accessed in facilities hosted in Canada and may or may not receive the same level of privacy protection.**

Storage of Data:

- Electronic data and will be stored by the Principal Investigator on OneDrive. Data will be shared with the student researcher securely through Microsoft OneDrive. Only the principal investigator and the student researcher will have access to the OneDrive file.
- Two formats will be used to guard against data loss. The first will be an html file, which will be unmodified and kept as an original of the survey data stored on the PI's USask OneDrive. The second will be a Microsoft OneDrive access file, which will be converted into an SPSS file that will be used for data analysis.
- Data will be retained for 5 years post-publication, as per the University of Saskatchewan Guidelines
- The master list containing identifying information will be stored separately from the data collection. The master list will be destroyed on May 1, 2022.

Right to Withdraw:

- Participation in this survey is voluntary.
- You can decide not to participate at any time by closing your browser or choose not to answer any questions you do not feel comfortable answering.
- Your right to withdraw data from the study will apply until April 30, 2022. After this, it is possible that some form of research dissemination will have already occurred, and it may not be possible to withdraw your data.
- By clicking, "yes" at the bottom of this page, you do not waive any of your legal rights.

Follow up:

- To obtain results from the study, please send an email request to the principal investigator (kevin.spink@usask.ca) or student researcher (karly.anderson@usask.ca).
- Results are expected to be completed no later than May 30, 2022.

Questions or Concerns:

- Contact the researcher(s) using the information at the top of page 1.
- This research project has been approved on ethical grounds by the University of Saskatchewan Behavioural Research Ethics Board. Any questions regarding your rights as a participant may be addressed to that committee through the Research Ethics Office: ethics.office@usask.ca; 306-966-2975; out of town participants may call toll free 1-888-966-2975.

CONSENT TO PARTICIPATE

STUDY TITLE: An Examination of the Lifestyle Activities of Retired Adults

I have read, or someone has read to me, the information in this consent form.

I understand the purpose and procedures, and the possible risks and benefits of the study.

I was given sufficient time to think about the study and my participation.
I had the opportunity to ask questions and have received satisfactory answers.
I understand that I am free to withdraw from this study at any time for any reason and the decision to discontinue will not affect my relationship with the principal investigator, the research student, the College of Kinesiology, or the University of Saskatchewan.
I give permission to the use and disclosure of my de-identified information collected for the research purposes described in this form.
By agreeing to participate in this study I do not waive any of my legal rights.

By agreeing to the below consent statement and completing the following survey, you indicate that you understand the above conditions and agree to participate in this study.

Yes No

Participant Survey 1

Thank you for participating in this survey. Your responses are important to us. In this study, we are interested in examining two lifestyle activities – walking and watching television.

First, we are going to ask some questions about you. Please answer each question honestly. If you do not feel comfortable answering any of the questions, please move to the next question.

1. What is your age?

_____ years

2. What is your gender?

3. Are you currently retired?

Yes No

4. What is your highest level of education?

- Primary/Middle school
- High/Secondary school
- University/college degree
- Graduate degree
- Other: _____

5. What is your ethnicity? (Check all that apply)

- | | |
|--------------------------------------|--|
| <input type="checkbox"/> Indigenous | <input type="checkbox"/> Latin American |
| <input type="checkbox"/> White | <input type="checkbox"/> Arab |
| <input type="checkbox"/> South Asian | <input type="checkbox"/> Southeast Asian |
| <input type="checkbox"/> Chinese | <input type="checkbox"/> West Asian |
| <input type="checkbox"/> Black | <input type="checkbox"/> Korean |
| <input type="checkbox"/> Filipino | <input type="checkbox"/> Japanese |
| Other: _____ | |

We are now interested in two specific lifestyle activities you likely do everyday - walking and watching television. We want you think about walking and television watching over the **previous 7 days** and answer the following questions.

First, think of a typical day for you during the previous 7 days. Please circle it below.

Mon Tues Wed Thurs Fri Sat Sun

For the day you just identified, we would like you to think about three time periods – morning, afternoon, and evening for both walking and watching television.

First, we would like you to think about **walking**.

Morning – walking

1. On that typical day you identified, how much time in the morning did you spend walking to be active? (i.e., from the time you woke up – noon)

Include only those times when you **intentionally** walked to be active.

_____ hours and _____ minutes

Afternoon – walking

2. On that typical day you identified, how much time in the afternoon did you spend walking to be active? (i.e., from noon – 6:00pm)

Include only those times when you **intentionally** walked to be active.

_____ hours and _____ minutes

Evening – walking

3. On that typical day you identified, how much time in the evening did you spend walking to be active? (i.e., from 6:00pm until the time you went to bed)

Include only those times when you **intentionally** walked to be active.

_____ hours and _____ minutes

4. When you walked to be active on that typical day you identified, how did you walk? Choose one of the options below that is most applicable (i.e., if you walk with a group while with a pet, choose the option that you believe is most connected to your walking behaviours).

- Alone
- With a partner (i.e., husband, wife, significant other, friend, sibling, etc.)
- With a group of people
- With a pet
- Other: _____

5. When you walked to be active on that typical day you identified, what was the main purpose? (e.g., shopping, to visit friends/family, for entertainment, for a personal walk, to volunteer, as an escort/accompaniment to a friend/relative, for sport, etc.)

Now, we would like you think about **watching television on the typical day you noted above.**

Morning – watching television

6. On that typical day you identified, how much time in the morning did you spend sitting watching television? (i.e., from the time you woke up – noon)

_____ hours and _____ minutes

If you answered 0 hours/minutes to question 6, please skip to question 9.

7. During that time watching television in the morning, how many times did you intentionally stand up to break up sitting too long? (i.e., not at all, 1x, etc.)

Include only those times when you intentionally stood up to break up sitting too long and do NOT include the times you stood up because you had to such as answering the phone or going to the bathroom.

_____ times

8. What is the longest period of continuous sitting that you did at any one time while watching television during the morning of that day (i.e., the time between when you wake up – noon)?

_____ hours and _____ minutes

Afternoon – watching television

9. On that *typical day you identified*, how much time in the afternoon did you spend sitting watching television? (i.e., from noon – 6:00pm)

_____ hours and _____ minutes

If you answered 0 hours/minutes to question 9, please skip to question 12.

10. During that time watching television in the afternoon, how many times did you intentionally stand up to break up sitting too long? (i.e., not at all, 1x, etc.)

Include only those times when you intentionally stood up **to break up sitting too long** and do NOT include the times you stood up because you had to such as answering the phone or going to the bathroom

_____ times

11. What is the longest period of continuous sitting that you did at any one time while watching television during the afternoon of that day (i.e., the time between noon – 6pm)?

_____ hours and _____ minutes

Evening – watching television

12. On that *typical day you identified last week*, how much time in the evening did you spend sitting watching television?

_____ hours and _____ minutes

If you answered 0 hours/minutes to question 12, please move to the next page.

13. During that time watching television in the evening, how many times did you intentionally stand up to break up sitting too long? (i.e., not at all, 1x, etc.)

Include only those times when you intentionally stood up **to break up sitting too long** and do NOT include the times you stood up because you had to such as answering the phone or going to the bathroom.

_____ times

14. What is the longest period of continuous sitting that you did at any one time while watching television during the evening of that day (i.e., the time between 6pm – bedtime)?

_____ hours and _____ minutes

Please read the following information.

You may be asked about this information in survey 2.

(the messages will be randomly assigned in this green textbox – see Appendix D)

1. The information in the message was believable.

1 2 3 4 5 6 7
(strongly disagree) (strongly agree)

2. The information in the message was persuasive.

1 2 3 4 5 6 7
(strongly disagree) (strongly agree)

3. The information in the message was easy to understand.

1 2 3 4 5 6 7
(strongly disagree) (strongly agree)

The following questions ask about your intentions to **add more walking to your day**. Please indicate how much you agree with the following statements.

1. I intend to increase my walking over the next seven days.

1 2 3 4 5 6 7 8 9
(strongly disagree) (strongly agree)

2. I plan to increase my walking over the next seven days.

1 2 3 4 5 6 7 8 9
(strongly disagree) (strongly agree)

3. I will likely increase my walking over the next seven days.

1 2 3 4 5 6 7 8 9
(strongly disagree) (strongly agree)

To ensure the delivery of survey 2 to your resident mailbox, please provide researchers with your **address**. Only the researchers will have access to the raw data and your responses will not be linked to your address.

Please confirm your address.

[to be included in online survey]

We invite you to provide your **[first name (if in person)/email (if online)] in the box below**. Your [name/email] will be used to match up responses between survey 1 and survey 2. Only the researchers will have access to the raw data and your responses will not be linked to your name.

Please confirm your [name/email] from above:

Thank you for your participation.

Survey 2 will be delivered to you in seven days after the completion of survey 1.

Appendix D: Message Conditions

Trending/OE

Not being active enough and sitting too much appear to be the norm for retired adults in Canada. However, research conducted with retired adults in the Prairie Provinces has found that the number of **retired adults working to increase their walking while at the same time trying to reduce sitting behaviour** has *increased over the last few years*. Two years ago, the percentage was 19%, last year it was 24%, and this year it is **34% of retired adults doing both**.

There are benefits to those making those changes as research reveals that many (around **91%**) of those who increase both their walking and decrease their sitting time, **even in small amounts**, show *improvements over time* in their fitness and health such as:

- ✓ improved ability to **perform daily activities**
- ✓ improved **bone and muscle strength**
- ✓ improved **cardiovascular system**
- ✓ improved **mental alertness**
- ✓ improved ability to **manage stress**

Join that steadily increasing number of retired individuals who are improving their fitness and health by **increasing** their walking and **reducing** their sitting behaviour. Here are some ways they are doing this.

To increase walking, they are making small changes like building more **walking into daily tasks** that they already do such as:

- walking around more before entering stores and more when inside stores
- walking around the house when talking on the phone

To decrease sitting, they are disrupting their sitting time by **intentionally standing up** while **watching television**. **They are doing this** by making small changes such as:

- standing up to stretch during commercials
- standing up between shows

Trending/No OE

Not being active enough and sitting too much appear to be the norm for retired adults in Canada. However, research conducted with retired adults in the Prairie Provinces has found that the number of **retired adults working to increase their walking while at the same time trying to reduce sitting behaviour** has *increased over the last few years*. Two years ago, the percentage was 19%, last year it was 24%, and this year it is **34% of retired adults doing both**.

Join that steadily increasing number of retired individuals who are increasing their walking and reducing their sitting behaviour. Here are some ways they are doing this.

To increase walking, they are making small changes like building more **walking into daily tasks** that they already do such as:

- walking around more before entering stores and more when inside stores
- walking around the house when talking on the phone

To decrease sitting, they are disrupting their sitting time by **intentionally standing up** while **watching television**. **They are doing this** by making small changes such as:

- standing up to stretch during commercials
- standing up between shows

Attention Control

When adults retire, they sometimes feel that they have extra time on their hands that leads to feelings of boredom. There are many ways to relieve boredom, including making the decision to go back to work full time or part time or even starting one's own business. However, research shows there are increasing number of retired adults who are taking up new hobbies to fill that extra time and reduce the boredom.

While different hobbies will suit different people, two things to keep in mind when selecting a hobby include 1. It needs to be enjoyable and 2. It needs to give you a sense of purpose.

Some of the top hobbies for those who are retired include travel, volunteering in your community, learning to cook new dishes, learning to play a musical instrument, learn a new language, painting, and writing stories. Or for the more adventurous, you could take up woodworking, metalworking, or antiques.

Join that increasing number of retired individuals who are relieving their boredom by taking up a new hobby that is both enjoyable and meaningful.

Survey 2 – Examination of the Lifestyle Activities of Retired Adults

Thank you for participating in survey 2. Your responses are important to us.

We want you think about walking and television watching over the **previous 7 days** and answer the following questions.

First, think of a typical day for you during the previous 7 days. Please circle it below.

Mon Tues Wed Thurs Fri Sat Sun

For the day you just identified, we would like you to think about three time periods – morning, afternoon, and evening for both walking and watching television.

First, we would like you to think about **walking**.

Morning – walking

1. On that typical day you identified, how much time in the morning did you spend walking to be active? (i.e., from the time you woke up – noon)

Include only those times when you **intentionally** walked to be active.

_____ hours and _____ minutes

Afternoon – walking

2. On that typical day you identified, how much time in the afternoon did you spend walking to be active? (i.e., from noon – 6:00pm)

Include only those times when you **intentionally** walked to be active.

_____ hours and _____ minutes

Evening – walking

3. On that typical day you identified, how much time in the evening did you spend walking to be active? (i.e., from 6:00pm until the time you went to bed)

Include only those times when you **intentionally** walked to be active.

_____ hours and _____ minutes

4. When you walked to be active on that typical day you identified, how did you walk? Choose one of the options below that is most applicable (i.e., if you walk with a group while with a pet, choose the option that you believe is most connected to your walking behaviours).

- Alone
- With a partner (i.e., husband, wife, significant other, friend, sibling, etc.)
- With a group of people
- With a pet
- Other: _____

5. When you walked to be active on that typical day you identified, what was the main purpose? (e.g., shopping, to visit friends/family, for entertainment, for a personal walk, to volunteer, as an escort/accompaniment to a friend/relative, for sport, etc.)

Now, we would like you think about **watching television on the typical day you noted above**.

Morning – watching television

6. On that typical day you identified, how much time in the morning did you spend sitting watching television? (i.e., from the time you woke up – noon)

_____ hours and _____ minutes

If you answered 0 hours/minutes to question 6, please skip to question 9.

7. During that time watching television in the morning, how many times did you intentionally stand up to break up sitting too long? (i.e., not at all, 1x, etc.)

Include only those times when you intentionally stood up to break up sitting too long and do NOT include the times you stood up because you had to such as answering the phone or going to the bathroom.

_____ times

8. What is the longest period of continuous sitting that you did at any one time while watching television during the morning of that day (i.e., the time between when you wake up – noon)?

_____ hours and _____ minutes

Afternoon – watching television

9. On that *typical day you identified*, how much time in the afternoon did you spend sitting watching television? (i.e., from noon – 6:00pm)

_____ hours and _____ minutes

If you answered 0 hours/minutes to question 9, please skip to question 12.

10. During that time watching television in the afternoon, how many times did you intentionally stand up to break up sitting too long? (i.e., not at all, 1x, etc.)

Include only those times when you intentionally stood up **to break up sitting too long** and do NOT include the times you stood up because you had to such as answering the phone or going to the bathroom

_____ times

11. What is the longest period of continuous sitting that you did at any one time while watching television during the afternoon of that day (i.e., the time between noon – 6pm)?

_____ hours and _____ minutes

Evening – watching television

12. On that *typical day you identified last week*, how much time in the evening did you spend sitting watching television?

_____ hours and _____ minutes

If you answered 0 hours/minutes to question 12, please skip to question 15.

13. During that time watching television in the evening, how many times did you intentionally stand up to break up sitting too long? (i.e., not at all, 1x, etc.)

Include only those times when you intentionally stood up **to break up sitting too long** and do NOT include the times you stood up because you had to such as answering the phone or going to the bathroom.

_____ times

14. What is the longest period of continuous sitting that you did at any one time while watching television during the evening of that day (i.e., the time between 6pm – bedtime)?

_____ hours and _____ minutes

15. Do you remember reading a message about physical activity and sedentary behaviours among retired adults during the last survey?

Yes No

16. If yes, from the options listed below, which resembles the overall theme of the message you read?

- 35% of retired adults are **both walking and standing** which has *increased over the last three years* **and** many (>90%) report health benefits associated with doing these two behaviours
- 35% of retired adults are **both walking and standing** which has *increased over the last three years*
- An increasing number of retired adults are relieving their boredom by taking up a new hobby that is enjoyable and meaningful

Thank you

Thank you for taking the time to complete survey 2.

[to be included in mail questionnaire]

We invite you to provide your **first name in the box below**. Your name will be used to match up responses between survey 1 and survey 2. Only the researchers will have access to the raw data and your responses will not be linked to your name.

Please confirm your name from above:

[to be included in online survey]

We invite you to provide your **[first name/email] in the box below**. Your [name/email] will be used to match up responses between survey 1 and survey 2. Only the researchers will have access to the raw data and your responses will not be linked to your name.

Please confirm your [name/email] from above:

Thank you for your participation.

We now invite you to read the following pages to enter your name for the chance to win a gift certificate for your continued participation.

Please indicate if you would like to be entered to win a 50 dollar gift certificate for your participation. The email you indicate below will not be linked to your data and will remain separate from all previous responses.

Yes – enter my email into the draw No – do not enter my email into the draw

Please **indicate the email** in which you would like to be contacted at:

Please **confirm the email** you provided above:

Appendix F: Debriefing Form

PRINCIPAL INVESTIGATOR:

Kevin S. Spink, PhD
College of Kinesiology, University of Saskatchewan,
87 Campus Drive, Saskatoon, SK, S7N 5B2
Phone: 306-966-1074
Email: kevin.spink@usask.ca

STUDENT RESEARCHER:

Karly Anderson (Masters Student)
Phone: 306-812-7881
Email: karly.anderson@usask.ca

Dear Participant,

Thank you for taking the time to participate in our study examining lifestyle activities of retired adults. It is important that we continue to investigate the lifestyle activities of retired adults.

By way of clarification, you were told that the general purpose of the study was to examine lifestyle activities of retired adults, including walking and watching television. While correct, our specific purpose was to understand the influence of a normative message on physical activity (walking) and sedentary (watching television) behaviours. Normative messages, specifically descriptive norms, are intended to motivate people by providing information about the behaviours of other people. In this study, some of you received specific norm messages relating to the walking and television watching behaviours of retired adults in the Prairie Provinces. Normative messages have been previously used in research and behaviour change has been noted, so we hypothesized that the type of message received would influence changes in lifestyle behaviours, specifically to increase walking and decrease sedentary behaviours.

As we crafted the specific norm message you received to test our predictions, it is possible that the lifestyle behaviour comparisons that you received about retired adults in your message may have differed from the actual lifestyle behaviour levels of that group. As this is a new area, to our knowledge, there are currently no existing statistics regarding the percentage of Canadian retired adults working to increase their physical activity and reduce their sedentary behaviours. We do know, however, that physical activity guidelines have recently changed to include the importance of increasing light-intensity activity (e.g., walking) and decreasing sedentary behaviours (e.g., watching television) for one's overall health. For more information pertaining to the current 24-Hour Movement Guidelines please visit the following website:
<https://csepguidelines.ca/guidelines/adults-65/>

We would like to remind you that you are still able to withdraw your data at this point with absolutely no penalty. You can withdraw your data up until April 30, 2022, after which the results of the study may have been disseminated.

If you are interested in learning more about the findings of this study, we would be pleased to provide a summary to you. The researchers expect to have the results completed by May 30, 2022. To receive this summary, please contact either of us at the email addresses listed above after this date and we will email the summary to you. If you have any further questions about the study itself, please feel free to contact us.

Once again, thank you for making a valuable contribution to our research.

Sincerely,
Kevin S. Spink, PhD

Karly Anderson
Masters Research Student