COMPARING THE EFFECTIVENESS OF AFFECTIVE AND COGNITIVE MESSAGES FOR IMPROVING ATTITUDES AND INTENTIONS TO TAKE BREAKS FROM SITTING AT HOME AND AT WORK

by

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Abstract

There is a lack of evidence regarding the types of messages that are effective in combating the growing issue of sedentary behaviour among adults. The purpose of the study presented in this thesis was to test the effectiveness of affective, cognitive, and control messages for improving adults’ attitudes and intentions to take breaks from sitting at home and at work. The study also sought to understand whether a match or a mismatch between message type (affective, cognitive) and participant attitude basis (affective, cognitive) resulted in greater attitude change.

Two-hundred and ninety-one working adults were recruited from Amazon Mechanical Turk. Participants completed a pre-message questionnaire that assessed leisure-time physical activity, sitting time and habit, break frequency, perceived behavioural control (PBC), social norms, intentions, and overall, structural, and meta-cognitive attitudes towards breaks from sitting at home and at work. Participants were then randomly assigned to one of three message conditions before completing the post-message questionnaire that reassessed all attitudes, intentions, PBC, and social norms, as well as need for affect and need for cognition. ANCOVAs and repeated-measures ANOVAs were used to explore differences between the conditions and domains, respectively. Regressions were used to test for matching/mismatching effects.

Study findings indicate that there was a significant difference between the affective and control conditions on intention change (home; \( p < 0.05 \)), such that participants in the affective condition showed significantly greater intention change (home) compared to participants in the control condition. There were no significant differences between the affective and control conditions on the remaining attitude and intention change variables (\( ps > 0.05 \)), nor any significant differences between the affective and cognitive conditions on any of the attitude and intention
change variables (ps>0.05). In addition, there were no significant differences between domains in attitude or intention change (ps>0.05). Finally, regressions revealed a relative matching effect for attitudes (home), such that of participants with an affectively-based attitude, those exposed to an affective message had significantly greater positive attitude change compared to those exposed to a cognitive message (p<0.05), but there was no significant difference in attitude change (home) in response to the different messages in those with cognitively-based attitudes (p>0.05). No effects were found for attitudes (work; p>0.05). Future studies should test the impact of these messages on behaviour.
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List of Abbreviations

HIT: Human intelligence task
LTPA: Leisure-time physical activity
MTurk: Mechanical Turk
MVPA: Moderate-to-vigorous physical activity
PBC: Perceived behavioural control
TPB: Theory of Planned Behaviour
Chapter 1

Introduction

1.1 Overview

Previously regarded as being synonymous with physical inactivity, sedentary behaviour is now seen as being a separate class of behaviours (Marshall, 2010; Tremblay, Colley, Saunders, Healy, & Owen, 2010). Experts define sedentary behaviour as being any waking activity that requires an energy expenditure of $\leq 1.5$ metabolic equivalents and includes mainly sitting or lying down (Sedentary Behaviour Research Network, 2014). This shift in understanding has come about as a result of strong evidence linking sedentary behaviour to health outcomes, independent of physical activity level (Marshall, 2010; Owen, Leslie, Salmon, & Fotheringham, 2000; Tremblay et al., 2010).

Research on the prevalence of sedentary behaviour in adults indicates that adults spend the majority of their day (69%) sitting or lying down (Colley et al., 2011), and that the home and workplace environments are contributing to increases in sedentary behaviour through the simplification and automation of tasks (Owen, Healy, Matthews, & Dunstan, 2010). In addition, more adults are being employed in jobs that involve tasks that require little to no regular movement (Church et al., 2011). The prevalence of sedentary behaviour, when examined in the context of its negative health outcomes, is alarming, and efforts must be made to reduce the amount of sitting that adults engage in, particularly in the home and work domains.

Limiting sitting time and breaks from sitting have been identified as useful strategies for reducing prolonged sitting and associated health risks (Healy et al., 2008; Owen et al., 2011). Limiting sitting time involves reducing the total time spent sitting over a particular time period,
such as across the span of a day or a week, by replacing sitting with standing or walking. Breaking up sedentary time refers to reducing the total sitting time per “bout” of sitting, regardless of total volume of sitting per day or week. For example, a person may limit themselves to sitting no longer than 45 minutes at a time by interrupting their sitting with standing breaks every 45 minutes.

Many studies testing interventions aimed at reducing or breaking up sitting time have been environmentally-based (Alkhajah et al., 2012; Dutta, Koepp, Stovitz, Levine, & Pereira, 2014; Neuhaus et al., 2014; Pronk, Katz, Lowry, & Payfer, 2012), but fewer studies have explored individual-level interventions that seek to motivate adults to break up prolonged sitting, such as exposure to persuasive messages. Current evidence on the psychological and social correlates and determinants of sitting time and its interruption, such as the evidence from studies investigating the application of the Theory of Planned Behaviour (TPB) to sedentary behaviour, suggest that attitudes and intentions may be viable modifiable factors to target in individual-level interventions (Lowe et al., 2014; Prapavessis, Gaston, & DeJesus, 2015; Rhodes & Dean, 2009; Rhodes, Mark, & Temmel, 2012). Attitudes refer to one’s evaluation of an object, issue, or behaviour and are made up of two components: an affective component and a cognitive component (Crano & Prislin, 2006). The basis of an attitude refers to the component that is most dominant (i.e., most salient or influential) at a given moment. According to the TPB, attitudes are directly related to intentions, which refer to an individual’s willingness to engage in a behaviour. Intentions, in turn, are directly related to behaviour (Ajzen, 1991).

Affective and cognitive messages are persuasive messages designed to target an individual’s attitudes. These two message types have been compared extensively in the attitudes literature (Fabrigar & Petty, 1999; Millar & Millar, 1990) and have recently become popular in
the study of health behaviour, including physical activity. Currently in the physical activity literature, there is a shift towards integrating the role of affect and emotion into the study of behaviour. Previously, cognitive information, or rational, fact-based beliefs, were emphasized as being the best type of information to relay in persuasive messages. However, emerging research indicates that affect may have a very important role in motivating people to engage in health behaviours, above and beyond cognition (Keer, Conner, Putte, & Neijens, 2013; Keer, Putte, & Neijens, 2010; Kiviniemi, Voss-Humke, & Seifert, 2007; Lawton, Conner, & McEachan, 2009).

Thus, the study of affective and cognitive messages and their differential effects on attitudes, and subsequently intentions, is crucial if we are to understand how to best target these psychological determinants of behaviour and behaviour itself.

1.2 Relevance

Studies investigating the effects of affective and cognitive messages on attitudes, intentions, and behaviour are limited in the physical activity literature, however, the majority of existing studies report findings in the same direction. These studies identify affective messages as being more effective than cognitive messages, mixed affective/cognitive messages, and no message/neutral control messages at persuading people, including adults, adolescents, and university students, to engage in physical activity (Conner, Rhodes, Morris, McEachan, & Lawton, 2011; Evans & Wilson, (in preparation); Morris, Lawton, McEachan, Hurling, & Conner, 2015; Sirriyeh, Lawton, & Ward, 2010). Findings from the attitudes literature suggest that message effectiveness may be related to the dominant component (i.e., basis) of the attitude and its strength (Edwards, 1990; Fabrigar & Petty, 1999; Millar & Millar, 1990).

The effectiveness of these messages on improving attitudes, intentions, and behaviour in the context of sitting reduction and interruption has yet to be determined. In fact, to our
knowledge, there is currently no evidence regarding the content that is most suitable to include in a sedentary behaviour reduction/interruption message. This is problematic, as adults are spending a large portion of their waking hours in sedentary behaviours, putting them at risk of acquiring various negative health outcomes.

While environmental interventions are crucial in combatting sedentary behaviour, individual level interventions are just as vital. Changing the way someone thinks and creating strong feelings and beliefs about a behaviour allow for more room for transcending contexts and domains and for resisting the influence of environmental barriers. This is because when someone feels strongly about a behaviour, they are more likely to engage in this behaviour regardless of the environment or context in which they are present. Thus, it is imperative that the study of persuasive messages in the context of sedentary behaviour commences in order to understand how best to motivate people to reduce or break up their sitting time. Thus, the purpose of this study is to compare the effects of control, cognitive, and affective messages on working adults’ attitudes and intentions to take breaks from sitting at home and at work. In addition, we will test for matching/mismatching effects between attitude basis and message type in order to determine whether the persuasiveness of a message is dependent on the attitude basis of the message receiver.

1.3 Thesis Organization

This thesis is presented in a traditional style format and adheres to the requirements outlined in the Queen’s School of Graduate Studies’s “General Forms of Theses” as well as the guidelines set by the Queen’s School of Kinesiology and Health Studies. Six chapters are included in this thesis. Chapter 1 provides readers with an overview of the issue, the relevance of the thesis to existing literature, and the purpose of the thesis. Chapter 2 gives an overview of the
current literature on sedentary behaviour and its reduction and interruption as well as the
literature on attitudes, intentions, and messaging before restating the study purpose and outlining
the research questions and study hypotheses. Chapter 3 describes the methods used to conduct
the study and to collect data as well as the statistical tests used to analyse the data. Chapter 4
reports the results of the study, organized by research question. In Chapter 5, the results are
interpreted and discussed in the context of existing research. Chapter 5 also outlines the
limitations of the study, future directions, and the contributions of the study. Finally, a summary
and conclusion is provided in Chapter 6.
1.4 References


2.1 Sedentary Behaviour: A New Paradigm in Human Movement

Human movement is currently understood to exist on a continuum, with sleep occupying the lower end of the continuum and vigorous physical activity occupying the higher end. Between these two extremes lie sedentary behaviour, light activity, and moderate activity (Chaput, Carson, Gray, & Tremblay, 2014; Tremblay, Colley, Saunders, Healy, & Owen, 2010). Previously, the higher end of the continuum, in particular moderate-to-vigorous physical activity (MVPA) served as the dominant focus of public health attention. It was seen as the main health-related component of human movement and the primary form of energy expenditure (Chaput et al., 2014; Katzmarzyk, 2010; Tremblay et al., 2010). In fact, the physical activity guidelines, which recommend at least 150 minutes of MVPA per week, are informed by studies on MVPA in the form of exercise and purposeful physical activity. Individuals who do not meet the guidelines are considered sedentary and at an increased risk for disease compared to those who meet the guidelines. Hence, the dominant understanding of healthy human movement has had exercise at its core.

Research over the past 15 years, however, has clearly demonstrated the limit that this understanding places on progress in health promotion. Although the health benefits of regular physical activity for the general population are highly supported by decades of strong evidence, the conceptualization of sedentary behaviour as the opposite of physical activity is restrictive and even misguided (Katzmarzyk, 2010). Owen and colleagues’ (2000) instrumental review article was one of the first to suggest that sedentary behaviour is not a lack of physical activity, but is instead a distinct group of behaviours that may have independent effects on health (Owen, Leslie,
Salmon, & Fotheringham, 2000). Since then, a wave of studies investigating the health impact of sedentary behaviour, conceptualized as sitting or lying down, have been published. These studies have demonstrated that sedentary behaviour and its effect on health are different from those of physical inactivity, the term now used to describe a lack of physical activity (Marshall, 2010; Owen, Healy, Matthews, & Dunstan, 2010). Sedentary behaviour has recently been redefined as any waking activity that requires an energy expenditure of \( \leq 1.5 \) metabolic equivalents and includes mainly sitting or lying down (Sedentary Behaviour Research Network, 2014). Thus, according to this definition, regardless of whether or not an individual meets the physical activity guidelines, he or she may still be considered sedentary if a large portion of his or her day is spent sitting or lying down.

2.2 Sedentary Behaviour Research

Tremblay and colleagues (2010) highlight the importance of conceptualizing sedentary behaviour as distinct from physical inactivity and provide three main reasons to do so. First, they state that different metrics and indicators may be required to measure and assess sedentary behaviour. For example, while physical activity level may be captured by measuring the number of minutes of exercise an individual performs per week, time spent sitting or travelling in a car may be used as indicators of sedentary behaviour. Second, physiological responses to sedentary behaviour are not necessarily the same as physiological responses to physical inactivity, nor are they the opposite of physiological responses to exercise. Lastly, the unique nature of sedentary behaviour may necessitate different interventions and strategies for promoting reductions in this set of behaviours (Tremblay et al., 2010).

The contemporary conceptualization of sedentary behaviour has prompted the application of the behavioural epidemiology framework to the study of this group of behaviours. Owen and
colleagues (2010) outline the six steps of the framework (Figure 2.1): 1) determining the relationship between sedentary behaviour and health outcomes, 2) developing methods to assess sedentary behaviour, 3) identifying the prevalence of sedentary behaviour in different populations, 4) identifying the determinants and correlates of sedentary behaviour, 5) developing and testing interventions, 6) translating research into practice.

The first phase has received the most attention in sedentary behaviour research, followed by phases two and three. However, less has been done to identify individual and environmental influences on sedentary behaviour (phase four) and effective intervention strategies (phase five; Owen et al., 2010). The following two sections will briefly discuss the nature of sedentary behaviour and available guidelines for limiting and breaking up sedentary behaviour before reviewing the evidence in the first five phases.

Figure 2.1. Behavioural epidemiology framework for sedentary behaviour (Owen et al., 2010)
2.3 Sedentary Behaviour as a Group of Unique Behaviours

In their systematic review of the correlates of adult sedentary behaviour, Rhodes and colleagues (2012) highlight that sedentary behaviour is not a single behaviour, but rather, is a collection of different behaviours that may have their own set of unique correlates. For example, their findings point to a difference between television viewing and computer use, two behaviours that are often combined into a single category of “screen time”. While both share age and education as correlates, being older and less educated was positively associated with television viewing, whereas the opposite, being younger and more educated, was more strongly linked to high computer use. In addition, they found that lower levels of leisure-time physical activity were associated with higher levels of television viewing, but not computer use or general sitting behaviour (Rhodes, Mark, & Temmel, 2012). There is also evidence to suggest that the relationships between psychosocial correlates and various sedentary behaviours (e.g., television viewing, reading, etc.) are not uniform (i.e., the relationship between a correlate and different sedentary behaviours may not be the same across behaviours). However, as discussed later in the review, there are some correlates, such as attitudes and intentions, that unite these sedentary behaviours (Lowe et al., 2014; Prapavessis, Gaston, & DeJesus, 2015; Rhodes & Dean, 2009), and potentially allow for the creation of interventions that span multiple behaviours.

A common denominator that exists between most sedentary behaviours is sitting. Sitting is the most prevalent sedentary behaviour and a core component of almost every other sedentary behaviour, including watching television, using a computer, writing, reading, socializing, eating, transport in a car, etc. It is also largely habitual and a behaviour that people often perform without planning to (Conroy, Maher, Elavsky, Hyde, & Doerksen, 2013). Given its ubiquitous
nature and pervasiveness in most sedentary behaviours, sitting serves as an ideal target for sedentary behaviour interventions.

2.4 Sitting Guidelines

There are currently no established guidelines for sedentary behaviour reduction or breaks from sitting. However, an expert statement was established by Public Health England and Active Community Working Interest Group that recommends that employees begin by accumulating at least two hours of standing throughout their workday and work up to four hours per day of standing. Their recommendation regarding breaks from sitting was less specific, stating simply that employees should break up seated work by performing work tasks in the standing position (Buckley et al., 2015). Ryan and colleagues (2001) identified several recommendations that have been used previously in the literature: maximum sitting time of 20 consecutive minutes (Chartered Society of Physiotherapy, 2005 from Ryan, Dall, Granat, & Grant, 2011) or 30 minutes (Atlas & Deyo, 2001), or taking a five minute break every hour (Healy et al., 2008). They highlight, however, that these recommendations are not based on robust scientific evidence, but instead on the authors’ professional judgement (Ryan et al., 2011).

2.5 Health Outcomes of Sitting and Breaks from Sitting

The first phase of the research strategy outlined by Owen and colleagues (2010) and illustrated in Figure 1, determining health outcomes, is the most established and has the strongest evidence base of the six phases. Studies investigating the effects of sedentary behaviour on health indicate that sitting or lying down for long periods of time have detrimental effects on both physical and mental health. For example, sedentary behaviour increases adults’ risk of metabolic disorder, obesity, type 2 diabetes, high plasma triglyceride levels and blood pressure, as well as low levels of high density lipoprotein, and weak bones (Hamilton, Healy, Dunstan, Zderic, &
Sedentary behaviour has also been linked to breathing difficulties, chest pain, and psychological distress (e.g., depression, stress, and anxiety; Kilpatrick, Sanderson, Blizzard, Teale, & Venn, 2013; Peeters, Burton, & Brown, 2013).

Although many of the health outcomes associated with sedentary behaviour and physical inactivity overlap (Warburton, Nicol, & Bredin, 2006), the physiological mechanisms through which sedentary behaviour contributes to the development of disease is different from the mechanisms of inactivity (Tremblay et al., 2010). Furthermore, exercising does not always counter the negative health effects of sedentary behaviour, such as in the case of bone metabolism, and, therefore, should not be promoted as a strategy for sedentary behaviour reduction, as is currently done in several mass media campaigns (Knox, Biddle, Esliger, Piggin, & Sherar, 2014).

Limiting the total volume of sedentary time by standing up or walking while completing otherwise sedentary tasks (e.g., walking meeting) is one way to avoid the increased risk of disease associated with excessive sedentary behaviour. Another strategy is to break up bouts of prolonged sitting (Owen et al., 2011). There is evidence to suggest that the pattern in which sedentary behaviour is accumulated may be just as critical to health as the total volume of sedentary time (Healy et al., 2008). For example, a person who spends the majority of his or her day sitting, but takes breaks from sitting throughout the day is at a lower risk for disease than a person who sits down for the same total amount of time, but does not take breaks (Healy et al., 2008). In fact, breaks from sitting have been associated with improved levels of blood glucose and insulin levels in overweight, obese, and healthy individuals (Dunstan et al., 2012; Healy et al., 2008; Peddie et al., 2013). Furthermore, Healy and colleagues (2008) demonstrate that the
number of breaks in sedentary time was beneficially associated with waist circumference, body mass index (BMI), triglycerides levels, and 2-hour plasma glucose levels, regardless of the total sedentary time, level of MVPA, and the average intensity of the breaks. Standing breaks have also been shown to decrease upper back pain and improve mood states (e.g., decreased fatigue, increased energy) and overall mood (Matic, Osmani, Popleteev, & Mayora-Ibarra, 2011; Pronk, Katz, Lowry, & Payfer, 2012). These results indicate that it is not only important to limit the total amount of sedentary behaviour, but also to interrupt prolonged bouts of sedentary behaviour through standing or activity breaks, regardless of total sedentary time.

2.6 Sedentary Behaviour Measurement and Prevalence

The prevalence of sedentary behaviour (phase three) cannot be accurately quantified without reliable and valid measurement tools (phase two). Currently, self-report tools, such as questionnaires and behavioural diaries/logs, are the most common way of obtaining a measure of adults’ sedentary behaviour (Clark et al., 2009; Healy, Matthews, Dunstan, Winkler, & Owen, 2011; Marshall, 2010). Questionnaires, in turn, are the most popular form of self-report because they are relatively inexpensive and can be implemented on a large scale (Clark et al., 2009). However, they are prone to various types of error and bias, such as social desirability bias and recall bias. Behavioural logs are less susceptible to error and often provide more accurate measurements, but they require a higher level of participant burden and administrative costs (Healy et al., 2011).

The reliability and validity of a self-report tool are important indices of the quality of the tool. Current evidence on these psychometric properties indicate a high level of variability among sedentary behaviour self-report tools. Reliability often varies by the type of sedentary behaviour measured, with measures of sedentary behaviours that are performed regularly or in
long bouts showing generally higher reliability (Clark et al., 2009). Variance in validity, on the other hand, has been attributed to the use of a variety of referent measures (e.g., behavioural logs, accelerometers, heart rate monitors; Clark et al., 2009).

Objective measures, such as accelerometers, have also been used to assess sedentary behaviour. Accelerometers are small movement sensors that can be worn on the hip or the arm and measure patterns of activity over time. They are often used to measure physical activity level, and can be useful for assessing sedentary behaviour (Tremblay, Colley, Saunders, Healy, & Owen, 2010). They are limited, however, in their ability to capture contextual information (e.g., sitting while watching TV versus reading) as well as in their ability to distinguish between lying down, sitting, and standing. In contrast, inclinometers, which can be worn on the thigh, can capture data related to postural orientation, making them useful for measuring patterns of sedentary behaviour and breaks from sitting (Tremblay et al., 2010).

The 2007-2009 Canadian Health Measures Survey used accelerometers to assess the prevalence of physical activity and sedentary behaviour engagement in Canadian adults. Results indicate that adults spent approximately 9.5 hours per day (69% of their waking hours) engaging in sedentary behaviours (Colley et al., 2011). Data from the 2003-2004 National Health and Nutrition Examination Survey indicate that American adults between the age of 20 and 59 years old spent 7.25 to 7.87 hours of their total waking hours engaging in sedentary behaviour (Matthews et al., 2008).

The prevalence of sedentary behaviour is on the rise, particularly among working adults, as the increased automation and simplification of work- and house-related tasks translate into decreased demand for movement (Owen, Healy, Matthews, & Dunstan, 2010). Church and colleagues (2011) indicate that between 1960 and 2010, there was a substantial shift in work-
related activity in the US. For example, in the 1960’s, approximately 50% of occupations in the private industry required at least a moderate level of activity (Church et al., 2011). By 2010, this number had decreased to under 20% of occupations. In addition, a higher percentage of Americans are being employed in service-based occupations (e.g., information, professional and business services, education services) which involve mostly sedentary tasks, while less are working in goods-producing (e.g., mining, construction) and farm jobs, which require moderate intensity work (Church et al., 2011). These findings corroborate Brownson and colleagues’ report (2005) that household- and work-related activity declined between 1950 and 2000 and that more people were entering jobs that required a low level of activity (Brownson, Boehmer, & Luke, 2005).

2.7 Correlates and Determinants of Sedentary Behaviour

Given that adults are spending the majority of their day in sedentary pursuits and that excessive sedentary behaviour is linked to serious negative health outcomes, there is a great need to develop and test interventions that motivate adults to reduce or break up their sedentary time (phase five, Figure 1). In order to design effective interventions, however, appropriate intervention targets need to be determined. In particular, these targets need to be modifiable factors (i.e., correlates/determinants) that are associated with sedentary behaviour and its reduction or interruption (phase four, Figure 2.1). The social ecological model is a useful way of organizing these different factors. Social ecological models assume that factors that influence behaviour exist at multiple levels and that these levels interact to exert their influence upon human behaviour (Sallis, Owen, & Fisher, 2008). Owen and colleagues’ (2011) ecological model of sedentary behaviour recognizes that behavioural influences include intrapersonal factors (e.g., biological characteristics, socioeconomic status, attitudes, etc.) as well as social factors (e.g.,
social norms, parental relationship, role models, etc.) and environmental factors (e.g., chairs, walkability of neighbourhood).

In addition to exploring the various levels of influence on sitting, it is also important to consider the domain-specific factors that influence sitting. Behavioural domains can be grouped into four main categories: workplace, home, leisure-time, and transport (Owen et al., 2011). In line with the concept of behavioural specificity, it is likely that the physical (e.g., chairs) and social (e.g., norms) attributes of each behavioural domain shape sitting patterns. For example, norms regarding sitting and standing during office meetings in the workplace may influence an individual’s choice to take breaks from sitting. Similarly, the presence of multiple televisions in the home may stimulate greater levels of television viewing behaviour. Only recently have researchers begun to recognize the importance of behavioural specificity in sedentary behaviour research, thus, studies investigating domain-specific correlates of sedentary behaviour are beginning to emerge. For example, a recent study by Bennie and colleagues (2014) compared sitting time across the work, leisure-time, and transport domains in desk-based employees and found that over 50% of their sitting occurred at work, while a third occurred during leisure-time, and just over 10% occurred during transport, suggesting that the workplace and the home may be strategic domains in which to target sedentary behaviour (Bennie, Timperio, Crawford, Dunstan, & Salmon, 2011). De Cocker and colleagues (2014) explored the correlates of occupational sitting in 993 Australian workers and found that workers with mostly sedentary job tasks, higher education and income, those who worked in white collar and professional jobs and were inactive were more likely to sit more at work compared to workers whose jobs were less sedentary, and who had lower education and income, worked in blue collar jobs, and were active, respectively (De Cocker, Duncan, Short, van Uffelen, & Vandelanotte, 2014).
Specifying the domain and environment in which behaviour is studied is particularly relevant to sitting. This is because sitting is partially habitual, and habits are regulated by environmental and contextual cues (Conroy, Maher, Elavsky, Hyde, & Doerksen, 2013). Thus, in order to understand and influence sitting, the domain in which it takes place, as well as the correlates and determinants associated with it, must be clearly outlined and specified.

2.8 The Psychology of Sedentary Behaviours

A significant portion of the knowledge about sedentary behaviour correlates is based on evidence from studies investigating sociodemographic factors. While knowing the sociodemographic correlates of sedentary behaviour allows researchers to identify at-risk populations, many sociodemographic correlates (e.g., age) are not modifiable and therefore cannot be directly targeted for change in interventions. On the other hand, many psychological and social factors (e.g., attitudes, social norms, etc) are modifiable and can be targeted for change. With the differentiation between sedentary behaviour and physical inactivity, there has been an increase in studies exploring the psychological and social factors associated with sedentary behaviour. For example, in addition to exploring sociodemographic factors, De Cocker and coauthors (2014) examined several social and psychological factors associated with limiting sitting time at work. Their results indicate that workers who think sitting less is valuable, pleasant, healthy, and relaxing as well as workers who feel that they have less control over sitting at work report higher levels of sitting than workers who did not think sitting was valuable, pleasant, healthy, relaxing or that they have less control over their sitting at work. In addition, those with higher intentions to reduce sitting and those who believe that people who are important to them think they should sit less at work reported sitting more than those with lower intentions to sit and those who do not believe that people who are important to them think they
should sit less (De Cocker et al., 2014). In this study, employment status and occupational classification moderated the relationship between control over sitting less and occupational sitting. The authors also found positive associations between a lack of control over sitting less at work and part- and full-time work status, and white collar and professional occupations (De Cocker et al., 2014), suggesting that one’s occupation may have a strong influence on his or her perceived level of autonomy related to sitting at work. In their systematic review of sedentary behaviour correlates, Rhodes et al. (2012) found general support for the association between television viewing and positive attitudes towards television viewing, depressive symptoms, and life dissatisfaction. They also reported positive associations between computer use and positive attitudes towards computer use.

2.9 Sedentary Behaviour and Theory

Researchers have also tested the applicability of behaviour change theories to sitting behaviour. For example, Quartiroli and Maeda (2014) tested how well the components of Self-Determination Theory (behavioural regulations and psychological needs) could predict physical activity and sitting behaviour. The researchers found that the theory was better at predicting physical activity than sedentary behaviour. In fact, while all significant associations between the theory’s components and physical activity were positive, the associations with sedentary behaviour were negative or null (Quartiroli & Maeda, 2014).

Several studies have also applied the Theory of Planned Behaviour (TPB; Figure 2.2.), a theory used to predict behaviour in specific contexts (Ajzen, 1991), to the study of sedentary behaviour (Lowe et al., 2014; Prapavessis et al., 2015; Rhodes & Dean, 2009). This theory posits that a person’s behaviour is directly determined by his or her intentions to engage in the behaviour. According to Ajzen and Fishbein (1977), a behaviour is comprised of four elements:
an action that is performed (e.g., eating; standing), a target at which the action is directed (e.g.,
strawberries; body), a context in which the action is performed (e.g., kitchen; office), and time
(e.g., snack time; while speaking on the phone; Ajzen & Fishbein, 1977). Intentions are an
indication of one’s readiness or willingness to engage in a behaviour (Ajzen, 2011) and are
determined by the person’s attitudes towards a behaviour, social norms around a behaviour, and
perceived behavioural control (PBC) to engage in a behaviour (Ajzen, 1991). Attitudes,
discussed in more detail later in the review, are evaluative judgements made about the
favourability of engaging in a behaviour (Ajzen, 1991). These evaluative judgements are a
summary of two main components: the affective component (termed affective attitude) and the
cognitive component (termed cognitive attitude; Ajzen, 2011). Subjective norms are the
perceived social pressures to/not to engage in a behaviour and can be broken down into
injunctive norms (perceived level of approval to engage in the behaviour) and descriptive norms
(whether or not other people are performing the behaviour; Ajzen, 1991; Rivis & Sheeran, 2003).
Finally, PBC refers to one’s perceived level of ease or control over performing a behaviour
(Ajzen, 1991; Rivis & Sheeran, 2003). In some studies, PBC and attitudes have been directly
linked to behaviour (Armitage & Conner, 2001; Keer, Conner, Putte, & Neijens, 2013; Keer,
Putte, & Neijens, 2010; Kiviniemi, Voss-Humke, & Seifert, 2007; Rhodes, Fiala, & Conner,
2009).
The principle of compatibility is central to the TPB. It states that behaviour is best predicted when the determinants of behaviour are defined and measured to the same level of specificity as the behaviour (Ajzen, 2005, 2011). This is particularly true for attitudes; in order to effectively predict behaviour from attitudes, the attitudes measured must involve the same action, target, context, and time elements as the behaviour. Although the issue of incompatibility has been less common for the other constructs, the theory’s predictive ability is enhanced when there is compatibility between all of the constructs.

Using two distinct samples (an undergraduate and a community sample), Rhodes and Dean (2011) tested the predictive ability of the TPB for four different leisure-time sedentary behaviours: television viewing, computer use, reading/listening to music, and socializing. Their results confirmed the direct association between intention and behaviour, and attitudes and intentions for all four behaviours and in both samples. Attitudes also directly predicted computer use in the two study samples. Social norms and PBC showed less consistency in their relationship with intention across the four behaviours, with social norms predicting only
intentions to watch television and socialize in the community sample, and PBC predicting television viewing and socializing intentions in the undergraduate sample and intentions to read/listen to music in the community sample (Rhodes & Dean, 2009).

Prapavessis and colleagues (2015) point out that while leisure-time sedentary behaviours are often volitional (i.e., under one’s control), other forms of sedentary behaviour, such as occupational or school-related sedentary behaviour, are often not and, therefore, the applicability of the TPB may be different for these behaviours. Thus, they extended on the work of Rhodes and Dean (2011) by testing five different TPB models that differ in the degree of volition of the behaviour and by day of the week (weekend/weekday): 1) combined leisure-time sedentary behaviour (volitional) and work/school sedentary behaviour (non-volitional) all week, 2) non-volitional on weekday, 3) volitional on weekday, 4) non-volitional on weekend, 5) volitional on weekend. Prapavessis and colleagues (2015) found that the TPB constructs best explained model two (non-volitional on weekdays), accounting for 43% of the variance in behaviour. The other models fared more poorly, with 30%, 22%, 20%, 8% of the variance in models five, four, one, and three being accounted for by TPB constructs, respectively. The authors attribute the superiority of model two over model three in part to the use of two sedentary behaviours (e.g., sitting at work/school, and sitting in a motor vehicle to get to and from work/school) to assess work/school sedentary behaviours and 10 sedentary behaviours (e.g., sitting for religious or spiritual purposes, watching television, reading, doing arts and crafts) to assess leisure-time sedentary behaviour. They state that there may be greater compatibility between the behaviours and the theory’s constructs in model two as compared to model three because of the use of a fewer number of behaviours. As discussed above, the TPB emphasizes compatibility between its constructs, and the greater the number of behaviours that are conglomerated to create an
outcome, the less likely the theory will be able to account for the outcome behaviour (Ajzen, 2005, 2011). This is likely to have been the case in Prapavessis and colleagues’ (2015) study. In terms of the specific constructs of the TPB, intentions and social norms made significant contributions to four of the five models, attitudes were associated with intentions in three of the five models, and PBC was only associated with intentions at work during the weekday (model two).

Lastly, Lowe and colleagues (2014) tested how well physical activity attitudes, social norms, PBC, self-efficacy, and intentions could predict objectively measured sedentary behaviour in cancer patients with brain metastases. They found that both affective and cognitive attitudes were negatively related to sitting or lying down, but found no significant results for the other factors.

In summary, studies examining the utility of the TPB in explaining sedentary behaviour are limited and produce mixed findings. While the link between intention and behaviour is generally supported, results are more varied for social norms and even more for PBC. Every study, however, has provided evidence for a link between attitudes and intentions (Lowe et al., 2014; Prapavessis et al, 2015; Rhodes & Dean, 2009), and one study even demonstrated a link between attitudes and behaviour (Rhodes & Dean, 2009). The inconsistency of findings may be attributable to the variety of tools employed to measure the theory’s constructs. Using tools with undetermined or low validity can raise concerns about the behaviour being measured and creates difficulty in comparison across studies. In addition, all of the studies measured different behaviours, conceptualized the same behaviour in a slightly different manner, or did not specify the domain or context in which the behaviour takes place. This is problematic as the predictive ability of a model or theory is undermined when both the behaviour (e.g., sitting, breaks from
sitting) and the domain (e.g., workplace, home) are not clear and specific (Giles-Corti, Timperio, Bull, & Pikora, 2005). Finally, the TPB itself may not be taking into account automatic and habitual processes that prompt people to perform particular behaviours. The TPB is a theory that holds a controlled motivational process (intention) as the closest predictor of behaviour and does not take into account habitual processes that may regulate the behaviour (Conroy et al., 2013). Sitting, however, is largely habitual and a behaviour that people often perform automatically without consciously planning to (Conroy et al., 2013). For example, an employee may walk into his/her office in the morning and automatically sit down in the office chair. After work, they may go back home, eat dinner (while sitting), and then turn on the television and sit down to watch a show. In contrast, for most people, limiting or breaking up sitting time involves conscious motivational processes. It requires cognitive effort to monitor how long one has been sitting and to remember to stand up or walk around after sitting for a long period of time, unless there are certain environmental or physical cues to prompt the standing or walking. Although the research is limited, available evidence supports the inclusion of habit strength into theories of sitting (Conroy et al., 2013; Sudholz, 2014; Warner & Biddle, 2011).

2.10 The Habitual Nature of Sedentary Behaviour

A habit is an action characterized by automatic elicitation upon exposure to associated cues or contexts. It forms when the action is performed repetitively in the presence of a particular cue or in a specific context, such that a mental behaviour-context association is created and the action becomes automatically activated upon encountering relevant cues or contexts (Gardner, 2014; Gardner, Abraham, Lally, & de Bruijn, 2012). The speed at which a habit is formed or strengthened may vary and certain factors, such as the reinforcement value of performing the behaviour, may moderate the rate of formation or strengthening (Gardner, 2014). Habit strength
is hypothesized to be related to behaviour in two ways (Gardner, 2014). First, habit strength is positively correlated with behaviour. For example, the stronger one’s sitting habit at work, the more likely he or she is to report higher sitting time than someone whose sitting habit is weaker (Sudholz, 2014). Second, habit strength moderates the relationship between intention, a conscious motivational process, and behaviour. Stronger habit strength will weaken the relationship between intention and behaviour such that as the habit strengthens, conscious planning or deliberation to perform the behaviour is less needed (Gardner, 2014). For example, as an individual increasingly forms stronger associations between talking on the phone and standing up at home, they become more likely to stand up while talking on the phone without having to consciously remember or plan to stand up when they get a phone call.

Warner and Biddle (2011) examined the TPB with the addition of habit strength in the prediction of working adults’ occupational and leisure-time sedentary behaviour. Attitudes, social norms, and PBC explained some of the variance in occupational sedentary behaviour; however, intention was not significantly related to either occupational or leisure-time sedentary behaviour. Habit strength, on the other hand, explained some of the variance in both occupational and leisure-time sedentary behaviours. In fact, 34% of the variance in occupational sedentary behaviour was accounted for by habit strength (Warner & Biddle, 2011).

Conroy and colleagues (2013) hypothesized that both controlled (intentions) and automatic (habits) motivational processes regulate patterns of sedentary behaviour. They indicated that automatic motivational processes likely regulate engagement in sedentary behaviours and controlled motivational processes direct our reduction of or breaks from sedentary behaviour. For example, most people may sit on the couch out of habit when they enter their living room. However, they may consciously construct intentions to limit the amount of
sitting they do or they may plan to take breaks from sitting every hour. Conroy and colleagues (2013) tested this hypothesis by assessing sitting habit strength and intentions to reduce sitting time in 130 undergraduate students and collected their sitting time using self-report (14-day diary) and objective measures (accelerometers) of movement. They found that sitting habit strength was positively associated with sitting time, while intentions to limit sitting were negatively associated with sitting time. In addition, those who had stronger sitting habits reported weaker intentions to limit sitting. These results were true for both self-report and accelerometry-derived sitting. Finally, sitting time showed moderate to strong negative correlations with physical activity (Conroy et al., 2013). Given that no study has compared both intentions to sit (as opposed to intentions to limit sitting) and sitting habit, it remains unclear exactly how influential each motivational process is in shaping sitting behaviour. However, this study by Conroy and colleagues (2013) is important because it provides evidence that intentions to modify sitting may in fact be related to sitting behaviour, and thus, can be targeted in interventions focused on sedentary behaviour reduction or interruption.

2.11 Correlates of Reductions and Breaks in Sedentary Behaviour

In addition to Conroy and colleagues’ (2012) study, a handful of studies have explored the factors influencing reductions or breaks in sitting. Sudholz (2014), in his study with desk-based employees and managers, confirmed previous research findings that sitting habit strength is positively related to sitting behaviour. He also examined frequency of taking breaks and break-taking habit and found that the two were positively related; break-taking habit predicted increases in break-taking frequency. He found, however, that break-taking habit was extremely varied across the sample and that breaks from sitting were taken in order to complete workplace-related tasks, such as getting a paper from the printer, speaking with coworkers, or getting a drink of
water (Sudholz, 2014). Increases in “pro-sitting” environments and job tasks may reduce engagement in these naturally occurring breaks from sitting, and given that breaks have demonstrated a negative relationship with sitting time (Sudholz, 2014), these pro-sitting environments and tasks are likely to lead to greater levels of prolonged sedentary behaviour and, in turn, increased health risks.

Sudholz (2014) also found that the more workers thought that lack of energy to take breaks, giving low priority to breaks, high work demands, and lack of free time were barriers to breaks from sitting, the less breaks they took per hour. Likewise, Bennie and colleagues (2011) reported that the perception of lack of time was a hindering factor for taking breaks among men, while not having enough information was a limiting factor for taking breaks among women. Finally, findings from Greenwood-Hickman and coauthors (2015) support awareness of sedentary behaviour reduction as a motivator for reducing sedentary behaviour in overweight and obese older adults, along with the desire to improve health and ease of incorporating sedentary behaviour reduction strategies. Existing health conditions, fatigue, enjoyment of sedentary behaviours, difficulty of understanding sedentary behaviour reduction as different from increasing physical activity, and an unadaptable environment were the main barriers to reducing sedentary behaviour (Greenwood-Hickman, Renz, & Rosenberg, 2015). Most sedentary behaviour reduction interventions have focused on eliminating the last barrier: an unsupportive (physical) environment.

2.12 Sedentary Behaviour Interventions

The majority of sedentary behaviour reduction interventions have been implemented in occupational settings. For example, some studies have investigated the effectiveness of activity-permissive workstations, such as height-adjustable workstations and treadmill desks, in the
workplace (Alkhajah et al., 2012; Dutta, Koepp, Stovitz, Levine, & Pereira, 2014; Neuhaus et al., 2014; Pronk et al., 2012). Although most studies examined only short-term impacts, the evidence suggests that interventions that incorporate certain types of activity-permissive workstations (e.g., height adjustable desks) are effective for reducing sedentary time without negatively impacting work performance, and that participants generally express positive evaluations of activity-permissive workstations (Neuhaus et al., 2014). Another intervention strategy used to reduce prolonged sitting is the implementation of prompts that cue participants to stand or engage in some physical activity. Although limited, current prompt-based sedentary behaviour interventions show encouraging results, particularly for passive prompts (Cooley & Pedersen, 2013; Evans, Fawole, Sheriff, Dall, & Ryan, 2012; Lang, McNeil, Tremblay, & Saunders, 2015).

Both installation of activity-permissive workstations and prompts are environmentally-based interventions whereby an aspect of the environment (e.g., adjustable workstations, prompts) is manipulated to facilitate the reduction or interruption of sedentary behaviour. Despite the relative success of these interventions, it is not surprising that some studies have shown that upon study completion, adults often cease to take standing or activity breaks to the same degree as when the environmental structures or cues were present, some even returning to baseline levels after the intervention period (Cooley & Pedersen, 2013; Pronk et al., 2012). For example, Pronk and colleagues (2013) found that, during the 13-week intervention in which workers were given height-adjustable workstations, workers significantly decreased their sitting time. During the two-week follow-up period, the workstations were taken away and workers’ sitting levels increased to above baseline levels. Findings from this study (Pronk et al., 2012) and from a study by Cooley and Pederson (2013) suggest that the presence of environmental structures or cues are useful for reducing sitting behaviour, but they do not necessarily impact adults’ internal
motivation to reduce or break up their sitting time in the absence of these structures or cues. Consistent with the ecological model, interventions that target many levels of influence (e.g., environmental, individual) are likely to be more effective in the long term than interventions that target only one level (Sallis et al., 2008). However, little is known about the types of interventions that increase adults’ internal motivation to reduce or interrupt their sitting time. While some interventions have included an individual level educational or persuasive component (Evans et al., 2012; Healy et al., 2013), no study has yet investigated which types of persuasive messages are most effective for motivating adults to reduce sitting time or increase breaks in sitting.

2.13 Mass Media Messages

The use of mass media messages as a strategy to motivate adults to begin (e.g., exercise) or terminate (e.g., smoking) a behaviour is appealing to health promotors. This is because mass media messages can be used to reach a large audience, repeatedly and over time, in a cost-effective manner (Randolph & Viswanath, 2004; Wakefield, Loken, & Hornik, 2010). To the author’s knowledge, only one published study to date has examined sedentary behaviour messages. Knox and colleagues (2014) performed a content analysis of mass media campaign messages targeting sedentary behaviour reduction in the USA, Canada, UK, and Australia. Four main themes emerged from the analysis. First, messages tend to rely on sedentary behaviour guidelines for children that recommend less than two hours of screen time per day (e.g., “engage in no more than two hours of recreational screen time”). Second, the messages often recommend substituting sedentary behaviour with physical activity (e.g., “Turn off the screens. Turn up the play”), less often promoting lower intensity activity (e.g., standing). The focus of the campaigns appears to be centered on reducing sedentary behaviours in order to live a more active lifestyle.
Third, and similar to the second theme, advertisements often confound sedentary behaviour reduction with MVPA engagement. Lastly, messages often portray sedentary behaviour through negative pictures and words (Knox et al., 2014).

There is a need to understand the message content that is most suitable for sedentary behaviour campaigns. Without this information, campaigns that are both effective and cost-efficient cannot be created. It is inefficient to spend resources on mass media campaigns that are ineffective and do not yield changes on the individual and/or societal levels. Thus, understanding what constitutes effective sedentary behaviour reduction mass media messages is vital in combating the growing issue of sedentary behaviour.

2.14 Physical Activity Mass Media Messages

Since there is currently no evidence regarding effective sedentary behaviour reduction messages, health promotion messages that have been found to be effective for other behaviours can be leveraged as a starting point for exploring sedentary behaviour reduction messages.

Physical activity messages have been explored widely. Latimer and colleagues (2010) performed a systematic review investigating the effectiveness of three types of physical activity messages: tailored messages, messages that seek to change self-efficacy, and gain/loss-framed messages. They indicate that tailored and gain-framed messages are generally more effective for motivating physical activity intentions than non-tailored messages and loss-framed messages, respectively. They also point to mixed evidence regarding self-efficacy messages, but state that there is a positive trend towards support for using theory-based messages that target self-efficacy (Latimer, Brawley, & Bassett, 2010).

There is also growing interest in testing and comparing affective and cognitive messages. Affective messages convey the sensorial, social, and/or emotional experiences associated with a
behaviour in an attempt to directly elicit emotions within the receiver. Cognitive messages, on the other hand, relay rational, fact-based information and beliefs about a behaviour (Dubé & Cantin, 2000; Rosselli, Skelly, & Mackie, 1995). Physical activity messages have traditionally focused on relaying cognitive outcomes associated with a behaviour and often neglect affective outcomes. The underlying assumption of cognitive messages is that decision making (e.g., decision to limit sitting) is based on rational and deliberate consideration of the usefulness or harmfulness associated with a behaviour (Conner, Rhodes, Morris, McEachan, & Lawton, 2011; Keer et al., 2010; Kiviniemi et al., 2007). This is misleading as it neglects the role of affect in shaping the decisions people make, a role that is now increasingly being emphasized as the evidence grows in support of affect’s link to intentions and, importantly, to behaviour. The increased awareness of the influence of affect on health decision making has prompted investigations into the differential effect of affective and cognitive messages on attitudes, intentions, and behaviour. Most commonly, these two types of messages are examined in relation to the influence they have on people’s attitudes towards a message’s subject matter (Fabrigar & Petty, 1999).

2.15 Attitudes

An attitude is a link between the “representation of an attitude object and its evaluation in memory” (Krosnick & Petty, 1995). This evaluation is an “integration of cognitions and affects experienced in relation to an object” (Crano & Prislin, 2006). Consistent with this operationalization and with the dominant understanding of attitudes, two structural components make up overall attitudes: an affective component (often referred to as affective attitude) and a cognitive component (often termed cognitive attitude). Affective attitudes refer to the feelings or emotions associated with a particular object or behaviour, such as happiness or distress. In
contrast, cognitive attitudes refer to beliefs about positive and/or negative attributes of an object or behaviour, such as usefulness or harmfulness (Fabrigar & Petty, 1999; See, Petty, & Fabrigar, 2008). These two components are continuous in nature rather than dichotomous. In other words, they are not mutually exclusive, and overall attitudes are based on a combination of both components, rather than on one component or the other. However, one component often dominates the other in its influence on overall attitudes and becomes the base component, or the basis, of the overall attitude. Thus, overall attitude may be described as being affectively- or cognitively-based depending on which of its two components is most dominant. Overall attitudes dominated by their affective component are referred to as affectively-based attitudes and attitudes dominated by their cognitive component are known as cognitively-based attitude.

The strength of one’s attitude represents the extent to which it displays the following four features: persistence (over time), resistance (against persuasive attempts), impact on information processing, and impact on behaviour. Persistence and resistance are collectively known as the durability of an attitude, while impact on information processing and behaviour are jointly known as the impact of an attitude (Krosnick & Petty, 1995). While all four features are conceptually and empirically unique, they do directly and indirectly influence each other. Accessibility, the ease with which evaluative information comes to mind, is linked to attitude stability, with more accessible attitudes being stable and thus stronger over time (Giner-Sorolla, 2004; Krosnick & Petty, 1995). The stability of an attitude is also likely to be influenced by its resistance to attacks and its salience in memory (Krosnick & Petty, 1995).

The dominant basis of an attitude towards an action or an object as well as the cognitive/affective basis of the action or object itself have been shown to influence the accessibility of an attitude. While there is some evidence to suggest that the affective component
of an attitude is more accessible than the cognitive component (Verplanken, Hofstee, & Janssen, 1998), more recent research demonstrates that one’s dominant attitude and the cognitive/affective basis of an object/behaviour is likely to influence the evaluative information that is recalled when a person is faced with a decision regarding the object/behaviour (Giner-Sorolla, 2004). For example, if an individual has a predominantly affectively-based attitude towards a behaviour (e.g., “standing up and stretching makes me feel relaxed and energized”), feelings towards that behaviour may surface more quickly than cognitive evaluations when faced with a decision to perform that behaviour.

Recently in the attitude literature, there has been greater differentiation between the affective and cognitive structural components of an attitude and the affective and cognitive meta-cognitive bases of an attitude. While the structural components of an attitude can be thought of as the “architecture” of the attitude (i.e., what the attitudes actually are), meta-cognitive bases of attitude refer to an individual’s perception about their attitude (See et al., 2008). Research shows that these two attitudinal properties do not always overlap (See et al., 2008). For example, while an individual may perceive that their attitude is based on rational thought (cognition) rather than emotion, evaluation of their structural base may indicate that the structural base is actually affectively-based. Studies have also found weak correlations between perceived and actual knowledge (Krosnick, Boninger, Chuang, Berent, & Carnot, 1993; Wood, Rhodes, & Biek, 1995) and moderate correlations between perceived ambivalence and structural ambivalence (Priester & Petty, 1996; Thompson, Zanna, & Griffin, 1995). See and colleagues (2008) demonstrated the importance of affective and cognitive meta-cognitive properties of attitudes in a series of three studies. Most relevant to the current thesis is study two, which found that meta-
cognitions explained some of the variance in attitude change in response to a message above and beyond the structural properties (See et al., 2008).

### 2.16 Attitudes and Persuasive Messages

Considerable research has been conducted to understand whether persuasive messages that match an individual’s dominant attitude basis yield more attitude change than messages that mismatch the attitude basis. While findings are generally mixed, there is considerable evidence in support of matching effects (Dubé & Cantin, 2000; Fabrigar & Petty, 1999; Mayer & Tormala, 2010). Attitude change is more likely to occur when an individual holding an affectively-based attitude is exposed to an affective message compared to when that individual is exposed to a cognitive message, and vice-versa for an individual with a cognitively-based attitude. Mayer and Tormala (2010) investigated match/mismatch effects with messages that were identical in structure and content, but were framed either through an individual’s thoughts (“I think that donating blood is one of the most important contributions I can make to society”) or feelings (“I feel that donating blood is one of the most important contributions I can make to society”). Their findings support a relative matching hypothesis: both measured and manipulated affectively-based attitudes were more vulnerable to “feel” framed messages than to “think” framed messages. In contrast, cognitively-based attitudes were more likely to change in response to “think” framed messages than “feel” messages. The authors also found that processing fluency (i.e., the ease with which information is processed) mediated the effects of the message on attitude. They indicate that information that matches the attitude base of the message receiver is easier to process than information that goes against or is dissimilar to the attitude base, and this ease in processing the message facilitates persuasion (Mayer & Tormala, 2010). Fabrigar and Petty (1999) also found evidence for a relative matching effect: affective persuasion attempts
were more successful against affectively-based attitudes than cognitively-based attitudes, but cognitive persuasion attempts were not any more effective for changing cognitively-based attitudes than affectively-based attitudes.

The strength of the original attitude, however, may play an important role in determining the effectiveness of mismatching and matching messages (Edwards, 1990; Fabrigar & Petty, 1999; Millar & Millar, 1990). Fabrigar and Petty (1999) suggest that matched messages may not be as effective as mismatched messages at changing strong attitudes, especially when the attitude is attacked by only a single message. They argue that a strong attitude has a strong basis that may act as a resource for resisting a message that directly attacks the existing basis, as matched messages do. Therefore, when an individual with a strong attitude is exposed to a matching message, their attitude basis is likely to be resistant to the message, and the individual may argue against the message. A mismatched message, however, may be more effective. While a matched message may directly target the basis of the attitude in an attempt to replace it with a new, and possibly opposing, basis, a mismatched message may only require linking a new basis to the existing basis. Therefore, the new information presented in the message may be integrated into the attitude and attitude change may result.

The effectiveness of mismatching and matching messages may also differ depending on whether an individual’s initial attitude is opposed to or in agreement with the message content. There is evidence to suggest that mismatching effects are likely to emerge when the message receiver is initially opposed to the message position, while matching effects are more likely to occur when the individual’s attitude is initially in agreement with the message (See, Valenti, Ho, & Tan, 2013).
Finally, differences in the structure of affectively- and cognitively-based may also play a role in attitude change in response to affective and cognitive messages. Some researchers have suggested that cognitively- and affectively-based attitudes differ in the strength of their resistance against affective and cognitive messages as a result of differences in their structure (Edwards, 1990; Fabrigar & Petty, 1999; Millar & Millar, 1990). Edwards (1990) postulated that the structure of cognitively-based attitudes is multi-dimensional, based on discrete attributes/beliefs (e.g. healthiness, efficiency) related to the issue, while affectively-based attitudes have a unidimensional structure that is set on a single global evaluative dimension (e.g., unfavourable-favourable). This difference in complexity makes cognitively-based attitudes difficult to change; in order for a message to effectively attack and change a cognitively-based attitude, the message must target the specific attribute(s) upon which the attitude is based. For example, if a person believes that taking a break from sitting is something that is done for health reasons, then a message would need to target one’s beliefs about the healthiness of breaks in order to improve one’s attitude towards taking a break from sitting. Edwards (1999) also suggested that affective attitudes were more easily changed by affective messages than cognitive messages because the affective message directly challenges the global evaluation, while the cognitive message can be readily integrated into the existing evaluative structure.

Neither matching/mismatching effects nor the differential effects of cognitive and affective messages have been explored in relation to sedentary behaviour; however, some studies have tested the effects of affective and cognitive messages on physical activity attitudes, intentions, and behaviour. Conner and colleagues (2011) found that an affective messages was more effective than a cognitive message or no message in changing self-report exercise behaviour of university students in two independent studies. Their findings indicate that these
improvements in behaviour were partially mediated by improvements in affective attitudes. One of the two studies included measures of need for affect (NFA) and need for cognition (NFC), two types of processing preferences. NFA refers to one’s “perceived desirability of emotions, the need to pursue them, and the belief that emotions are useful in shaping judgement and behaviour” (Conner et al., 2011). NFC is the “tendency for an individual to engage in and enjoy effortful cognitive activity” (Conner et al., 2011). Conner and coauthors’ (2011) found that the impact of the affective messages was enhanced for high NFA and low NFC individuals. Low NFA and high NFC individuals in the affective condition showed small significant increases in their behaviour although no effect was found for participants in the cognitive or no message conditions.

Finally, two studies examined the effectiveness of affect- and cognition-based messages that vary in temporal distance of outcomes. Evans and colleagues (in preparation) found that messages relaying proximal outcomes (e.g., short-term affective outcomes) were more effective at increasing self-regulatory efficacy and exercise motivation than messages relaying distal outcomes (e.g., long-term health outcomes), and messages with no temporal frame (Evans & Wilson, in preparation). An interesting study by Morris and colleagues (2015) compared physical activity messages that differed by message type (affective and cognitive) and temporal salience (proximal and distal). They found that a proximal affective message and a distal cognitive message were more effective at changing short-term physical activity behaviour than a distal affective message, a proximal cognitive message, and a control message, but that there was no significant difference between the proximal affective and distal cognitive messages (Morris, Lawton, McEachan, Hurling, & Conner, 2015).


2.17 Intention Strength and Attitude-Intention Relationship

Intentions reflect the extent to which a person plans to perform a behaviour and provide an indication of how motivated a person is to perform the behaviour (Cooke & Sheeran, 2013; Sheeran, 2002). According to TPB, intentions are directly related to behaviours, such that if an individual has high intentions to engage in a behaviour, they are likely to actually perform that behaviour.

Research on intention strength is far from being as comprehensive as research on attitude strength. Most studies have looked at the impact of intentions on behaviour and the factors that moderate the intention-behaviour relationship, however, other properties of intentions, such as durability and resistance, have not been examined thoroughly (Cooke & Sheeran, 2013). More recently, however, the attitude strength research has inspired some researchers to probe into the structure of intentions (Cooke & Sheeran, 2013). Of particular interest to this thesis is the temporal stability and resistance of intentions. Temporal stability refers to the consistency of intentions over time (i.e., whether they remain the same when assessed at two different time points), and resistance refers to whether the intention is able to withstand an attack (i.e., remain unchanged when challenged). Cooke and Sheeran (2013) indicate that intention stability may act as an outcome of strong, resistant intentions or it may act as an antecedent. In other words, the consistency of an intention over time may be a result of that intention being strong, resistant, and unchanging when challenged, or an intention may be strong and resistant because it is stable and consistent over time. In fact, research indicates that stable intentions are more resistant to an attack and are better predictors of subsequent behaviour than intentions that are more unstable (Cooke & Sheeran, 2013; Sheeran, Orbell, & Trafimow, 1999).
TPB also postulates that attitudes, PBC, and social norms are direct predictors of intention (Ajzen, 1991). When a person holds strong positive attitudes towards a behaviour, believes that others perform the behaviour and would like him/her to perform it as well, and when the person feels that the behaviour can be accomplished easily and is within his/her own control, he/she is likely to have high intentions to engage in the behaviour. Ajzen (1991) indicates that attitudes, social norms, and PBC may be more influential in some contexts compared to others. He investigated how well each of the three predictors of intention actually predict intention across several different types of behaviours, including health, political, and recreational behaviours, by compiling the results of 16 different studies testing the predictive ability of TPB. He found that social norms were not always significant predictors of intentions, but PBC significantly predicted intentions to engage in every behaviour assessed, and attitudes predicted intentions to engage in all but one of the behaviours. Interestingly, neither of the predictors of intention consistently served as the dominant predictor of intentions, however, for every behaviour, either attitudes or PBC were the strongest predictors.

Research has consistently demonstrated a significant relationship between attitudes and intentions to engage in physical activity (Chatzisarantis & Hagger, 2005; Hagger, Chatzisarantis, & Biddle, 2001; K. Hamilton & White, 2008) and, as previously described in this chapter, emerging research on sedentary behaviour demonstrates the ability of attitudes to predict intentions to engage in various sedentary behaviours (Prapavessis et al., 2015; Rhodes & Dean, 2009). Therefore, we can expect that by changing attitudes, we can also, indirectly, change intentions.
2.18 Conclusions, Research Questions, and Hypotheses

There is a lack of understanding of what constitutes a persuasive sedentary behaviour reduction message. Previously conceptualized as a lack of physical activity, sedentary behaviour is now understood as an independent behaviour with its own health outcomes and psychological and social determinants. Therefore, physical activity mass media messages are likely to be inadequate for addressing the growing concern of sedentary behaviour and, thus, mass media messages focused specifically on addressing sedentary behaviour need to be explored and established.

The purpose of this thesis is to understand which types of messages are most effective for improving attitudes and intentions to take breaks from sitting at home and at work and the impact of the messages on attitudes. In particular, the following research questions will be explored and hypotheses tested:

1. Is an affective message, a cognitive message, or a control message more effective for improving working adults’ attitudes and intentions to take breaks from sitting?

   - H1: Affective messages will be more effective than cognitive and control messages, and cognitive messages will be more effective than the control message at improving attitudes and intentions to take breaks from sitting at home and at work.

2. Are changes in attitudes and intention towards taking breaks from sitting consistent across domains (home and work)?

   - Given the lack of research related to differences in change across domains, no specific hypothesis is generated. However, we can predict that if there are differential changes in the predictors of intentions (i.e., attitudes, PBC, social
norms) between home and work, intention change will likely differ between the
domains in correspondence with changes in predictors.

3. Are matching or mismatching messages more likely to improve attitudes toward breaks at
home and at work?

- H2: There will be a matching effect between attitude bases and messages, such
  that a message that matches the attitude basis will be more effective at improving
  the attitude compared to a message that does not match the attitude basis.
2.19 References


Chapter 3

Methods

This chapter describes the two study phases: the message pre-test and the main study. Three different messages were tested in the first phase before they were used in the three conditions of the main study. As described below, pre-test and main study participants were recruited from Amazon Mechanical Turk, an online marketplace.

3.1 Amazon Mechanical Turk

Amazon Mechanical Turk (MTurk) is an online marketplace that enables “requesters” (task creators such as businesses or researchers) to upload human intelligence tasks (HITs; e.g., questionnaires) that are completed by “workers” (individuals who sign up on MTurk to complete HITs). Tasks are often completed for a monetary reward set by requesters; American citizens are paid in US dollars, citizens of India in Rupees, and non-American and Non-Indian workers are given Amazon gift cards (Ipeirotis, 2010).

In 2014, about 500,000 workers from 190 countries made up the MTurk workforce (Paolacci & Chandler, 2014), with most citizens being from the United States and India (Mason & Suri, 2012; Paolacci & Chandler, 2014). Compared to the general American population, the MTurk workforce tends to be younger ($M=32.3$ years) and more white, and include more women (60-70%; Berinsky, Huber, & Lenz, 2012; Ipeirotis, 2010; Paolacci & Chandler, 2014). According to Berinsky and colleagues (2014), workers are also slightly less educated and have lower incomes than the general American population. Although not representative of the
American population, the MTurk workforce is more representative as well as more diverse than convenience samples and student populations (Berinsky et al., 2012).

Ipeirotis (2010) investigated the reasons behind American and Indian workers’ use of MTurk. He found that of the Americans surveyed, about 12% said MTurk was their primary source of income and just over 60% said it was a secondary source of income. Ross and colleagues (2010) also found that money was important to MTurk workers; only 12% of US workers surveyed indicated that “MTurk money is irrelevant” (Ross, Irani, Silberman, Zaldivar, & Tomlinson, 2010). However, money does not seem to be the only driver for workers. About 70% of workers agreed that MTurk was a “fruitful way to spend free time and get some cash” (Ipeirotis, 2010). Furthermore, just over 30% said they participate on MTurk to “kill time” and over 40% said they complete tasks because they are “fun”, indicating that workers find some pleasure in completing tasks (Ipeirotis, 2010).

Given the unsupervised and anonymous nature of MTurk and that workers often complete multiple HITs per day and for monetary purposes, some researchers have investigated the quality of work obtained through this medium. For example, studies comparing the work (e.g. transcribing, music information retrieval, natural language processing tasks) of experts to that of MTurk workers found that the work quality was quite similar (Mason & Suri, 2012). MTurk workers have also shown comparable results to participants recruited through online discussion boards and student subject pools on standard judgement and decision-making studies, such as framing studies (Asian disease problem; Tversky & Kahneman, 1981) and studies on conjunction fallacy (Linda problem; Tversky & Kahneman, 1983; Mason & Suri, 2012). Finally, in three different studies, Hauser and Schwarz (2015) compared MTurk workers’ performance on online attention check questions to that of undergraduate students’ recruited from a university subject
pool. They found that MTurk workers performed significantly better on the attention checks than
the undergraduate sample when both simple and difficult attention checks were used, indicating
that MTurk workers may pay more attention to the study than participants recruited from
undergraduate subject pools. The downside to this is that MTurk workers may be undergoing
different mental processes when participating in studies than student or community samples and
this may have an influence on processing-based studies (Hauser & Schwarz, 2015).

3.2 Message Pre-Test

3.2.1 Participants

Forty-five participants were recruited through MTurk, however, data from only 44
participants were usable for the pre-test (28 men, mean age=36.93, SD=9.94; 16 women, mean
age=34.81, SD=6.8). Participants were required to meet the following criteria in order to
participate: 1) write, read, and understand English, 2) be between 18 and 64 years old, 3) reside
in North America, 4) be a part- or full-time employees whose primary workplace is outside the
home, and 5) be always or almost always sitting at work. Individuals were excluded from the
study if they: 1) were students, 2) were unable to stand or walk independently, 3) worked at
home or were unemployed, or 4) were on leave from work during study completion or would be
on leave in the two weeks following study completion. Workers whose IP address was not in
North America were automatically screened out by Qualtrics, the survey software used to create
the study instrument.

3.2.2 Procedure and Measures

Three types of messages were tested: control, cognitive, and affective messages
(Appendix A), each piloted on MTurk with 15 participants per message. The HIT (see Figure 3.1.
for a preview of how the HIT appeared to workers) was titled “Reactions to a Health
Advertisement” and was described as follows: “Tell us your reaction to a health promotion advertisement. Some initial qualification questions to determine eligibility - ineligible workers will not be compensated.” The keywords used were “survey, questionnaire, research, academic, university, health promotion, adults, experiment, and advertisement”. In addition to the inclusion and exclusion criteria outlined above, workers had to have a “HIT Approval Rate (%) for all Requesters’ HITs greater than or equal to 95”, which means that at least 95% of the HITs they have completed on MTurk have been accepted by requesters, and had to have “number of HITs Approved greater than or equal to 1000”, which indicates that they have completed at least 1000

![Pre-Test: Reactions to a Health Advertisement](image)

**Figure 3.1.** Pre-test MTurk HIT preview

HITs and had them approved. Those who met these qualifications were able to see a preview of the HIT.

The HIT (see Appendix B for the pre-test HIT) was posted on July 13, 2015 at 12:14 PM PDT and closed on July 17, 2015 at 2:26 AM PDT. Eligible workers providing consent to participate, completed an item inquiring about their perceived health status, and were subsequently randomized into either the control, the cognitive, or the affective condition. The
Average Time per Assignment was 7 minutes and 22 seconds and the Average Hourly Rate was $2.036 (workers were compensated with $0.25 for their time). Participants completed the pre-test questionnaire before viewing the message. On the message screen, the “next” button was disabled for 30 seconds, preventing participants from moving on to the post-message questions, and Qualtrics was programmed to record time spent on the message page that exceeded 30 seconds. Participants in all conditions were then asked attention check questions (“what was the message about?” and “Whose logo appeared on the message?”) and only the participants in the experimental conditions were asked about what appeared in the graphics on the message they saw (two graphics were on the messages).

Participants in the affective and cognitive conditions were asked to rate how believable, credible, and informative the message was using a seven-point semantic differential scale. Next, participants rated how much emotion they felt while reading the message on a five-point scale anchored with none/a lot, as well as the extent to which they relied on emotions and on rationality to evaluate the message on a five-point scale anchored with not at all/a lot. These items were adapted from (LaBarge, 2007) and the following items were created in line with the operationalization of the messages and for the purposes of this study. Participants were also asked to rate, using a seven-point Likert scale ranging from strongly disagree to strongly agree, how much they agreed with the following statements: “Reading this message made me consider the feelings that are associated with taking breaks from sitting”, “This message highlights the positive feelings and emotions one would experience by taking breaks from sitting”, “Reading this message made me think about the rational reasons to take a break from sitting”, and “This message stimulated my thoughts about why it would be beneficial to take breaks from sitting”. Finally, participants were asked if they had any suggestions for improving the advertisement, and
were asked to report their age, indicate their gender, the state/province in which they live, their race, highest level of education completed, employment status, the industry in which they were employed, and their household income.

3.2.3 Results

The results of the pre-test are shown in Table 3.1. There was no difference between the affective and cognitive conditions on ratings of message believability, credibility, and informativeness, nor any difference on the extent to which the participants in the three conditions relied on emotion and on rationality to evaluate the message ($p_{s}>0.05$). However, there was a difference between the control condition and affective and cognitive conditions on the degree of emotion felt while reading the message ($p_{s}<0.05$). Ratings of agreement that the message makes participants consider the feelings associated with taking breaks from sitting ($p_{s}<0.01$), makes them think about the rational reasons to take breaks from sitting ($p_{s}<0.001$), and that the message stimulated their thoughts about why it would be beneficial to take breaks from sitting ($p_{s}<0.001$) differed between the control and affective conditions, as well as between the control and cognitive conditions. Finally, ratings of agreement that the message highlights the positive feelings and emotions one would experience by taking breaks from sitting differed across the three conditions ($p_{s}<0.05$), with the affective condition showing the greatest level of agreement, followed by the cognitive condition.

Because the results of the pre-test suggested that the difference between the affective and cognitive messages was minimal, and because the cognitive group had higher ratings than the affective group on some affect-based items, the affective and cognitive messages were adjusted to enhance the difference between them (see Appendix C for revised messages). Pre-test attention checks indicated that many participants did not pay attention to both pictures on the
messages. Therefore, one of the pictures was removed and the “Easy Ways to Break Up Your Sitting” section was adjusted to fill the space created by the removal of the picture. The revised messages were not pilot tested again due to time and resource constraints, but the study manipulation checks indicate that the affective and cognitive messages were different from the control messages on all checks and that differences between the affective and cognitive messages were in the expected direction, though not all differences were significant. This will be discussed in more depth in the following chapter.

Table 3.1. Pre-test results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Control M (SD)</th>
<th>Cognitive M (SD)</th>
<th>Affective M (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Believability</td>
<td>-</td>
<td>6.33 (0.90)</td>
<td>6.23 (0.73)</td>
</tr>
<tr>
<td>Credibility</td>
<td>-</td>
<td>6.00 (1.07)</td>
<td>6.14 (0.77)</td>
</tr>
<tr>
<td>Informativeness</td>
<td>-</td>
<td>6.07 (1.03)</td>
<td>6.00 (1.08)</td>
</tr>
<tr>
<td>Emotion felt</td>
<td>1.67 (0.98)</td>
<td>2.73 (1.03)</td>
<td>2.64 (0.84)</td>
</tr>
<tr>
<td>Relied on emotion to evaluate message</td>
<td>1.93 (1.28)</td>
<td>2.53 (1.30)</td>
<td>2.43 (1.02)</td>
</tr>
<tr>
<td>Relied on rationality to evaluate message</td>
<td>3.47 (1.41)</td>
<td>3.80 (0.86)</td>
<td>4.21 (0.43)</td>
</tr>
<tr>
<td>Considered feelings associated with breaks</td>
<td>2.64 (1.82)</td>
<td>4.87 (1.41)</td>
<td>5.29 (1.27)</td>
</tr>
<tr>
<td>Thought about rational reasons to take breaks</td>
<td>2.60 (1.68)</td>
<td>5.87 (0.92)</td>
<td>5.79 (1.63)</td>
</tr>
<tr>
<td>Highlighted positives feelings/emotions</td>
<td>2.93 (1.49)</td>
<td>4.73 (1.58)</td>
<td>6.07 (0.73)</td>
</tr>
<tr>
<td>Stimulate thoughts about why breaks would be beneficial</td>
<td>2.87 (1.96)</td>
<td>5.93 (0.88)</td>
<td>5.64 (1.51)</td>
</tr>
</tbody>
</table>

Note: Means in a row that share the same superscripts were significantly different from each other based on Games-Howell post-hoc tests.

aSignificant difference between control and cognitive groups (p<0.05)
bSignificant difference between control and affective groups (p<0.05)
cSignificant difference between cognitive and affective groups (p<0.05)
3.3 Main Study

3.3.1 Study Design and Participant Eligibility Criteria

The study design was a 3 (condition: affective, cognitive, control) by 2 (time: pre-message and post-message) multi-factorial design. Participants were required to meet the following criteria in order to participate: 1) write, read, and understand English, 2) be between 18 and 64 years old, 3) reside in North America, 4) be part or full-time employees whose primary workplace is outside the home, and 5) be always or almost always sitting at work. Individuals were excluded from the study if they: 1) were students, 2) were unable to stand or walk independently, 3) work at home or were unemployed, 4) were on leave from work during study completion or would be on leave in the two weeks following study completion, 5) completed the message pre-test.

3.3.2 Sample Size Calculation

To our knowledge, no published study has investigated the differential effects of cognitive and affective messages on breaks from sitting or even sedentary behaviour. Thus, an effect size was drawn from the physical activity literature. Conner and colleagues’ study (2010), the only study comparing affective/cognitive messages that reported an effect size, reported an effect size of $\eta^2 = 0.17$ for the difference between study messages. Thus, this large effect size was used for this study. The following parameters were entered into G*Power© to calculate the sample size: effect size $f = 0.17$, $\alpha$ err prob=0.05, power (1- $\beta$ err prob)=0.80, numerator df=2, number of groups=3, corr among rep measures=0.5. The required sample size was 255 participants. Hoerger (2010) indicates that approximately 10% of participants drop out of internet-mediated studies, with an additional 2% drop out rate per 100 questions in the survey.
Thus, an additional 12% participants were added for a total of 298 participants. Data from 291 participants were actually usable for the study.

3.3.3 Procedures

The study instrument was created using Qualtrics Survey Software and a link to the study was uploaded to Amazon MTurk. Figure 3.2. shows how the HIT for this study was presented to workers on MTurk. The HIT was titled “Investigating Adult Movement” and was published on July 20, 2015 at 8:37 PM PDT and closed on July 29, 2015 at 4:47 PM PDT. The HIT was set to expire after 21 days, however, because the number of requested workers was reached before that time, MTurk automatically removed the HIT from the list of available tasks and was no longer accessible to workers. Therefore, it took approximately nine days to reach 298 workers. The Average Time per Assignment was 28 minutes and 58 seconds and the Effective Hourly Rate was $2.07. The description of the HIT was as follows: “Academic study on the movement patterns of adults – complete questionnaires and read a message. Some initial qualification questions to determine eligibility – ineligible workers will not be compensated.” Key words included in the HIT description were: “survey, questionnaire, research, academic, university, movement, adults, experiment”. In addition to the inclusion and exclusion criteria stated above, workers had to have a “HIT Approval Rate (%) for all Requesters’ HITs greater than or equal to 95” and “number of HITs Approved greater than or equal to 1000”. Those who met these qualifications were able to see a preview of the HIT.

Once a qualified worker pressed on the Qualtrics study link, they were taken to the study instrument on Qualtrics, which included a screening questionnaire, the information letter and consent form, pre-message questionnaire, message, post-message questionnaire, and debriefing letter (see Appendix D for the full study instrument). The study instrument was programmed to
automatically screen out workers whose IP address was not North American. Those who were not screened out by IP address then completed screening questions. Workers who did not meet the eligibility criteria were redirected to an “End of Survey” page and those who did meet the eligibility criteria were asked to provide consent.

Figure 3.2. Study MTurk HIT preview

Workers (hereafter referred to as participants) who provided consent moved on to complete the pre-message questionnaire that assessed the following: sitting time, sitting habit, frequency of breaks from sitting, perceived behavioural control (PBC) over taking breaks, social norms towards breaks from sitting, leisure-time physical activity (LTPA), global intentions to take breaks from sitting, and overall, structural, and meta-cognitive attitudes towards breaks from sitting. All measures, with the exception of LTPA, were assessed for home and work. Participants were then randomized into one of three study conditions (a control message condition, a cognitive message condition, and an affective message condition) and were shown the message that corresponded to their condition. The “next” button on the message page was disabled for 30 seconds while the participants viewed the message, preventing them from moving
on to the post-message questionnaire until the “next” button appeared. Time spent on the study message page was recorded without the knowledge of the participants (they were later informed of this in the debriefing letter). Finally, participants completed the post-message questionnaire that assessed global and specific intentions, overall, structural, and meta-cognitive attitudes, PBC, social norms, need for affect, need for cognition, and demographics. Manipulation and attention checks were also included.

To avoid order effects, the home and work items pertaining to the following measures were presented in random order: sitting time, sitting habit, frequency of breaks from sitting, social norms, and intentions. The affective and cognitive measures of structural and meta-cognitive attitudes also appeared in random order. Due to limitations in Qualtrics’s functions, a second random presentation for home and work items could not be applied to the overall, structural and meta-cognitive attitudes; participants answered attitude items pertaining to home first followed by attitude items related to work.

3.3.4 Study Conditions and Messages

As mentioned above, participants were randomized into one of three conditions: an affective message condition, a cognitive message condition, and a control message condition (Appendix C). Participants in all conditions received the following definition for sitting before the first sitting-related question was posed: “SITTING: includes sitting on a chair, couch, stool, bed, ground, etc. It does not include sitting while doing exercise, such as sitting and using a stationary bicycle or sitting in a yoga position.” A break from sitting was defined as follows: “A BREAK FROM SITTING: involves switching from being in a seated position to standing up for a period of time before sitting back down again, or standing up and walking around for a period of time before sitting back down again. Some examples include standing up and
stretching, standing up and walking to a printer or to get a drink/food, standing up to look out of a window, standing up while talking on the phone or to a friend/coworker/family member, etc.”

Both the affective and cognitive messages were gain-framed (Rothman & Salovey, 1997) and included the same tips for breaking up sitting time (e.g., “Stand up while talking on the phone”). They differed in the image, and in the content of the headline, the body of text, and the tagline. The bodies of text for the affective and cognitive messages were roughly matched for word count (137 and 122, respectively) and pieces of information related to sitting and breaks from sitting (13-15), and perfectly matched for number of lines (17), number of pictures (1), and number of words in the headline (7) and tagline (8). The organization and colours of the messages were the same.

Previous studies operationalized and/or created affective messages that conveyed the emotional, social, and/or physical feelings associated with a target behaviour (e.g., physical activity, milk consumption; Conner, Rhodes, Morris, McEachan, & Lawton, 2011; Dubé & Cantin, 2000; Sirriyeh, Lawton, & Ward, 2010) and cognitive messages that convey the instrumental benefits of the target behaviour (e.g. physical activity; Conner et al., 2011; Sirriyeh et al., 2010). Fabrigar and Petty (1999) suggest that for affective messages to truly influence attitudes and attitude bases, the message should elicit emotion in the reader. Therefore, the affective message, which was written in the form of a vignette, describes the positive physical (“…the tense feelings in her shoulders and back have disappeared”), social (“It warmed her heart when her family complimented her…”) and emotional (“…she feels more energetic and joyful…”) feelings a woman is experiencing as a result of taking breaks from sitting in an attempt to elicit positive emotions or feelings within the participants and to influence attitude bases. The cognitive message focuses on relaying the positive health benefits associated with
taking breaks from sitting (“Overall, breaks from sitting can make your heart healthier and bones stronger, reduce your risk of obesity, and improve your overall health”) in an attempt to elicit the participant’s thoughts about the utility of breaks from sitting and influence attitude bases. The affective outcomes relayed are mostly proximal outcomes, while the cognitive outcomes are mostly distal. The control message thanks respondents for their participation in the study thus far and includes the following statement: “Investigating adult movement is a study conducted on Amazon Mechanical Turk by researchers at Queen’s University, located in the Canadian province of Ontario.”

3.3.5 Measures

Table 3.2 shows the measures used in this study, when they were assessed, and which research question they were used to answer. A description of the measures used to answer at least one research question is provided below.

**Table 3.2.** Thesis measures, their time of assessment, and the research question they were used to answer

<table>
<thead>
<tr>
<th>Measure</th>
<th>Domain-specific</th>
<th>Pre-message measurement</th>
<th>Post-message measurement</th>
<th>Research Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sitting habit</td>
<td>✔</td>
<td></td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Break frequency</td>
<td>✔</td>
<td></td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Sitting time</td>
<td>✔</td>
<td></td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Leisure-time physical activity</td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall attitudes</td>
<td>✔</td>
<td></td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Attitude change</td>
<td>✔</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affective attitudes</td>
<td>✔</td>
<td></td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Cognitive attitudes</td>
<td>✔</td>
<td></td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Affective meta-cognitive attitudes</td>
<td>✔</td>
<td></td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Cognitive meta-cognitive attitudes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intentions</td>
<td>✔</td>
<td></td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Intention change</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Specific intentions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived behavioural control</td>
<td>✔</td>
<td></td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Social norms</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>1</td>
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<td>--------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Need for cognition</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Need for affect</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note: Viewing time, not used to answer any of the research questions, was measured during message viewing.*

### 3.3.6 Attitudes

Overall attitudes and affective and cognitive structural attitudes were assessed using items adapted from Crites, Fabrigar, & Petty (1994), while items adapted from See et al. (2008) were used to assess affective and cognitive meta-cognitive attitudes. To assess overall attitudes, participants were asked to respond to the item “I would describe my overall attitude towards taking breaks from sitting at home (at work) as…” using seven-point semantic differential scales that were anchored using the following four word pairs: negative/positive, bad/good, unfavourable/favourable, dislike/like. A mean of the responses to the four word pairs was computed to produce a composite score for both pre-message and post-message overall attitudes at home and at work (Cronbach’s α=0.95-0.97). Attitude change was the dependent variable used in the ANCOVA, repeated-measures ANOVA, and regressions that were conducted to answer research questions one, two, and three, respectively. This variable was created by subtracting the pre-message overall attitude score from the post-message attitude score.

The item “My feelings about taking breaks from sitting at home (at work) are best described as…” was used to assess affective structural attitudes. Participants responded to the item using seven-point semantic differential scales that were anchored with the following 13 word pairs: unpleasant/pleasant, nasty/nice, hate/love, sad/delighted, negative/positive, tense/calm, dislike/like, angry/relaxed, bored/excited, unfavourable/favourable, disgusted/accepting, bad/good, sorrowful/joyful.
Cognitive structural attitudes were assessed by asking participants to respond to the item “My thoughts about taking breaks from sitting at home (at work) are best described as…” using seven-point semantic differential scales anchored with the following 11 word pairs: useless/useful, foolish/wise, **bad/good**, unsafe/safe, harmful/beneficial, dislike/like, worthless/valuable, negative/positive, imperfect/perfect, unfavourable/favourable, unhealthy/wholesome.

Some researchers have suggested that, in order to accurately compare the affective and cognitive components, or bases, of attitude, the same word pairs (“target items”) should be used in the comparison (Giner-Sorolla, 2004; Peters et al., 2009; Verplanken, Hofstee, & Janssen, 1998). Four target items, bolded in the lists above, were used in this study and are the same as the word pairs used for overall attitudes. The remaining word pairs were included to provide an affective or cognitive context to the target items. A mean of the responses on the four target items was computed to produce a composite score for pre-message and post-message affective and cognitive attitudes at home and at work (Cronbach’s α=0.92-0.97).

Given evidence that meta-cognitive attitudes are uniquely associated with attitude change (i.e., independent of structural cognitive and affective attitudes; See, Petty, & Fabrigar, 2008), these were assessed and included as potential covariates in this study. Affective and cognitive meta-cognitive attitudes were assessed using the following item: “To what extent do you think your attitude towards breaks from sitting at home (at work) is driven by your emotions (beliefs)?” Participants responded using a seven-point semantic differential scale anchored with the pair “not at all driven by my emotions (beliefs)/completely driven by my emotions (beliefs).”
3.3.7 Intentions

To assess global intentions, participants were asked to indicate the extent to which they agreed with the item “I intend to take breaks from sitting at home (at work) over the next two weeks” using a seven-point Likert scale ranging from strongly disagree to strongly agree. This item was adapted from Ajzen (2006). Pre-message intentions were subtracted from post-message intentions to create the dependent variable intention change, which was used in ANCOVA and repeated-measures ANOVA analyses conducted to answer research questions one and two, respectively.

Participants were also asked to rank the likelihood that they would engage in the 13 specific types of breaks from sitting suggested in the cognitive and affective messages (e.g. “Stand up during meetings”) using a seven-point Likert scale ranging from very unlikely to very likely. They were also provided with a textbox and asked to elaborate on their rating. These qualitative data are not included in this thesis.

3.3.8 Covariates

In addition to affective and cognitive meta-cognitive attitudes and pre-message attitudes and intentions, several potential covariates were assessed: sitting habit strength (at home and at work), sitting time (at home and at work), frequency of breaks (at home and at work), LTPA, PBC (at home and at work), social norms (descriptive and injunctive; at home and at work), need for affect, need for cognition, and viewing time (see Table 3.2.).

Sitting habit, break frequency, LTPA, sitting time, need for cognition, need for affect, and time spent on message, and baseline PBC, social norms, overall attitudes, and intentions were to be included as covariates in the intention change (at home and at work) models. The same
variables were also to be included in the attitude change models with the exception of baseline intentions, and with the addition of affective and cognitive meta-cognitive attitudes.

Given that the study’s target behaviour was breaks from sitting, sitting habit and sitting time were assessed as potential covariates. Sudholz (2014) indicated that desk-based employees’ sitting habits were positively related to their sitting behaviour. Typically, the stronger one’s habit is, the harder it is to break, and the more likely the person is to engage in the habitual behaviour. Extending this to the current study context, the stronger one’s sitting habit, the more likely one is to spend time sitting, the harder it may be for the person to take breaks from sitting, and the less likely the person may be willing to take more breaks. Therefore, sitting habit and sitting time were assessed as potential covariates. Frequency of breaks, or in general TPB terms, “past behaviour”, was also included as a covariate. This is because past behaviour has been shown to influence attitudes and intentions, in addition to future behaviour (Ajzen, 1991; Hagger, Chatzisarantis, & Biddle, 2002).

In their study, Conroy and colleagues (2013) found moderate-to-strong negative correlations between physical activity level and sitting time. Therefore, in order to control for the impact of physical activity on change in intention and attitudes towards breaks from sitting, LTPA was included as a potential covariate. PBC, social norms, and overall attitudes were also included as potential covariates in the intention models because, according to the TPB and previous research, they are directly associated with intention (Ajzen, 1991; Hagger et al., 2002; Prapavessis, Gaston, & DeJesus, 2015; Rhodes & Dean, 2009). The TPB also suggests that PBC and social norms exert some influence on attitudes (Ajzen, 1991), thus, these two constructs were included as well. Baseline attitudes and intentions were to be incorporated in the respective
models as covariates because they have been previously shown to be predictive of future attitudes and intentions (Armitage, 2005).

Previous research indicates that need for affect and need for cognition influence attitude, intention, and even behaviour change in the context of affective and cognitive message exposure (Conner et al., 2011). In addition, message viewing time is often a reflection of the amount of attention paid to the advertisement (Lohse, 1997). Thus, need for cognition, need for affect, and viewing time were included as potential covariates. Finally, because research indicates that affective and cognitive meta-cognitive attitudes are related to attitude change (See et al., 2008), these were included as potential covariates in the attitude change models.

The covariates, cognitive meta-cognitive attitudes, pre-message attitudes (home and work), pre-message intentions at home, sitting habit (home and work), sitting time (home and work), LTPA, need for affect, need for cognition, and viewing time, were not included in the intended models/ANCOVA analyses because they did not meet assumptions of an ANCOVA test, including the assumptions of linearity and homogeneity of regression slopes. The testing of assumptions will be described further in the analysis section. With the exception of the analysis section, leisure-time physical activity, need for cognition, need for affect, and viewing time will not be discussed further in this thesis. Descriptive results for sitting habit, sitting time, and cognitive meta-cognitive attitudes will be reported.

3.3.9 Sitting Habit and Frequency of Breaks

The Self-Report Habit Index (SRHI; Verplanken & Orbell, 2003) was used to assess sitting habit and frequency of breaks from sitting. The SRHI has been criticized on the grounds that some of its items assess habit-irrelevant processes such as uncontrollability (Conroy, Maher, Elavsky, Hyde, & Doerksen, 2013; Rhodes & De Bruijn, 2010). Furthermore, some authors have
indicated that items measuring frequency may be confounded by non-automatic, past behaviour and, therefore, should not be included in the assessment (Conroy et al., 2013; Rhodes & De Bruijn, 2010). To mitigate such criticisms, Rhodes and de Bruikn (2012) and Conroy and colleagues (2013) modified the SRHI to contain only the items that measure automaticity (i.e., efficiency and lack of awareness). Conroy and colleagues (2013) further adapted the tool to include examples of possible locations where the behaviour of interest (sedentary behaviour) might take place in order to cue relevant context-behaviour associations. In line with these studies, the five items pertaining to automaticity were used to measure habit strength in this study. However, contrary to previous studies, the two items pertaining to frequency were also included. This is because the ubiquity of sitting habit is important in the context of this study; it is as important to understand if sitting occurs often as it is to understand if it occurs automatically in a particular context. Therefore, seven items in total were included in the assessment of sitting habit at home and at work.

Using a seven-point Likert scale anchored with the word pair strongly disagree/strongly agree, participants were asked to rate the following seven items for each of the two domains: “Sitting at home (at work) is something I do automatically”; “Sitting at home (at work) is something I do without having to consciously remember”; “Sitting at home (at work) is something I do without thinking”; “Sitting at home (at work) is something I start doing before I realize I’m doing it”; “Sitting at home (at work) is something I have no need to think about doing”; “Sitting at home (at work) is something I do frequently”; “Sitting at home (at work) is something that belongs to my daily routine”. An average of the responses on the seven items was calculated to create a composite score for sitting habit strength at home (Cronbach’s α=0.92) and at work (Cronbach’s α=0.91).
The two frequency-related items from the SRHI were also used to assess break frequency in each of the two domains. Participants were asked to rate each of the following items using a seven-point Likert scale ranging from strongly disagree to strongly agree: “Taking breaks from sitting at home (at work) is something I do frequently” and “Taking a break from sitting at home (at work) is something that belongs to my daily routine”. The two items pertaining to each of the domains were averaged to create composite scores for break frequency at home and at work. Internal consistency was excellent for break frequency at home (Cronbach’s $\alpha=0.91$) and good for break frequency at work (Cronbach’s $\alpha=0.80$).

3.3.10 Sitting Time and Time at Home and At Work

Average sitting time at home (weekday and weekend) and at work were assessed using adapted versions of items 26 and 27 of the International Physical Activity Questionnaire (Craig et al., 2003). For example, participants were asked “During the last 7 days, how much time did you spend sitting at home on a weekday?” and were provided textboxes to enter hours and minutes of sitting per day. Because this thesis examines behaviour in specific domains, it was important to capture the amount of time participants spent in each individual domain and, in turn, create a sitting time variable that is based on sitting time in a domain relative to time spent in that domain. Comparing domains and participants based on absolute sitting time, rather than relative sitting time, would be an ineffective comparison because it would fail to take into account how much time an individual spends in each domain. An individual who spends 10 hours at home on a weekend day and sits for five of those hours may be mistakenly treated as statistically equal to someone who also sits for five hours at home on a weekend day but is at home for six hours. While both individuals sit for five hours, the former only spends 50% of the time at home sitting, while the latter spends 83% of the time sitting. Thus, a relative sitting score, rather than an
absolute sitting score, was needed in order to achieve an accurate representation of sitting behavior in each domain and to effectively compare sitting time between domains. Time spent in each domain was assessed by asking participants how many hours per day they spent at work and at home (weekdays and weekends separately) and were provided a textbox to report hours and minutes.

To create the variable for sitting time at home, which represents the percentage of time spent sitting at home per week, the following steps were taken: 1) time (in hours) spent sitting at home and time (in hours) spent at home per weekday were each multiplied by five, 2) time (in hours) spent sitting at home and time (in hours) spent at home per weekend day were each multiplied by two, 3) time spent sitting at home (weekdays) and time spent sitting at home (weekend) were summed to create the subvariable “time spent sitting at home per week”, 4) time spent at home (weekdays) and time spent at home (weekend) were summed to create the subvariable “time spent at home per week”, 5) time spent at home per week was divided by time spent sitting at home per week to yield the main sitting time (home) variable: percentage of time spent sitting at home per week.

To create the variable for sitting time at work, which represents the percentage of time spent sitting at work per week, time (in hours) spent sitting at work and time (in hours) spent at work were multiplied by five. Subsequently, time spent at work was divided by the time spent sitting at work to yield the percentage of time spent sitting at work per week.

3.3.11 Perceived Behavioural Control

PBC over taking breaks at home and at work was assessed using adapted items from Ajzen (2006). Participants rated the item “I am confident that I can take breaks from sitting at home (work)” using a seven-point Likert scale ranging from strongly disagree to strongly agree.
3.3.12 Social Norms

Injunctive and descriptive social norms regarding breaks from sitting at home and at work were assessed using items adapted from Ajzen (2006). Participants rated the following items using a seven-point Likert scale ranging from strongly disagree to strongly agree: “Most people like me would take breaks from sitting at home (at work)” and “Most people who are important to me would approve of me taking breaks from sitting at home (at work)”. The two items for each domain were averaged to create a composite score for social norms. Internal consistency was acceptable for both social norms at home and at work (Cronbach’s α=0.75).

3.3.13 Demographics

Participants’ health status, gender, age, state/province, employment status and industry, race, education level, and 12-month household income were assessed. The states were combined into four regions (Northeast, Midwest, South, West USA) based on the classification system of the United States Census Bureau (United States Census Bureau, n.d.). Given that only two of the participants reported being from Canada, they were combined into one category (Canada). Employment industries were combined into “goods-producing” and “service-providing”, a form of classification used by the United States Department of Labor (Bureau of Labor Statistics, n.d). In addition, Church and colleagues used this classification in their 2011 study and reported the level of activity often required in occupations belonging in these categories. For example, they indicate that goods-producing jobs generally require a moderate level of activity, while service-providing occupations range from sedentary to light levels of activity (Church et al., 2011).

Finally, four participants indicated in the textbox pertaining to “other” in the item inquiring about race that they were “mixed” or “bi-racial”. Therefore, a separate category was created and presented for mixed/bi-racial individuals.
3.3.14 Attention and Manipulation Checks

Following measures of TPB constructs and specific intentions in the post-questionnaire, participants answered three attention check questions and 10 manipulation check items, which were the same items used in the pre-test. The attention check questions asked participants what the message was about, whose logo appeared on the message, and what the graphic in the message represented. To assess the fidelity of the manipulations, participants rated the believability, credibility, and informativeness of the message they had seen using a seven-point semantic differential scale. Following this, participants rated how much emotion they felt while reading the message, the extent to which they relied on their emotion and on their rationality to evaluate message, whether or not the message made them consider feelings/emotions associated with taking breaks, made them think about rational reasons to take breaks from sitting, stimulated their thoughts about why it would be beneficial to take breaks from sitting, and whether or not the message highlighted the positive feelings and emotions one might experience by taking breaks from sitting.

3.4 Analysis

3.4.1 Covariates

As mentioned, some covariates were not used in any of the ANCOVA analyses because they did not meet assumptions of linearity and homogeneity of regression slopes for an ANCOVA test. First, for a covariate to improve an analysis, it must be linearly related to the dependent variable. To test this, separate correlations were conducted between covariates and each of the four dependent change variables (attitude and intention change at home and at work); covariates that demonstrated a linear relationship with the corresponding dependent variable were included in an analysis testing for homogeneity of regression slopes, as discussed below.
Ten covariates were not significantly correlated with any of the dependent variables (attitude and intention change at home and at work): sitting habit (at home and at work), leisure-time physical activity, sitting time (at home and at work), cognitive meta-cognitive attitudes (at home and at work), need for cognition, need for affect, and viewing time. Therefore, none of these covariates were used in the models.

Covariates that did have a linear relationship with a dependent variable were tested to determine if they met the assumption of homogeneity of regression slopes. According to Field (2009), the relationship between a covariate and a dependent variable must be the same across all levels of the independent variable. A significant interaction between a covariate, the dependent variable, and the independent variable indicates a violation of the assumption of homogeneity of regression slopes (Field, 2009). Pre-message intentions at home, and pre-message attitudes at home and at work violated this assumption and were not included in the corresponding analysis. Covariates were only included in the model for which they met the ANCOVA assumptions. Therefore, affective meta-cognitive attitude (home) was included in the attitude change (home) model; PBC (home), social norms (home), and break frequency (home) were included in the attitude change (work) model; break frequency (home) was included in the intention change (home) model, and pre-message intentions (work) was included in the intention change (work) model (see Table 3.3).

Table 3.3. ANCOVA models for research question one

<table>
<thead>
<tr>
<th>Model</th>
<th>Dependent variable</th>
<th>Independent variable</th>
<th>Covariates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
<td>Attitude change at home</td>
<td>Message condition</td>
<td>Affective meta-cognitive attitudes</td>
</tr>
<tr>
<td>Model 2</td>
<td>Attitude change at work</td>
<td>Message condition</td>
<td>Perceived behavioural control</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Break frequency</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Social norms</td>
</tr>
<tr>
<td>Model 3</td>
<td>Intention change at home</td>
<td>Message condition</td>
<td>Break frequency</td>
</tr>
<tr>
<td>Model 4</td>
<td>Intention change at work</td>
<td>Message condition</td>
<td>Baseline intentions</td>
</tr>
</tbody>
</table>
3.4.2 Demographics and Testing Differences between Conditions and Domains

One-way ANOVAs and chi-square tests were conducted to ensure that participants were effectively randomized. Repeated-measures ANOVAs were conducted to determine whether there were any differences in the variables across time and between domains.

In order to answer research question one, separate ANCOVAs were conducted for each of the four dependent variables (overall attitude change at home, overall attitude change at work, intention change at home, and intention change at work) to yield four models (see Table 3.3.). Repeated-measures ANOVAs were conducted to investigate differences in attitude change and intention change across domains (research question two).

3.4.3 Testing for Matching/Mismatching Effects

Only the affective and cognitive conditions were included in the analysis testing for matching/mismatching effects. In order to test for matching/mismatching effects, we had to determine participants’ attitude basis. This was done in several steps. First, scores representing overall attitudes, affective attitudes, and cognitive attitudes were obtained by averaging the four target items corresponding to overall, affective, and cognitive attitudes. Second, two discrepancy scores (an affective and a cognitive score) were calculated by subtracting the affective attitude from the overall attitude, and by subtracting the cognitive attitude from the overall attitude. These discrepancy scores were then converted into their absolute values. The final attitude basis score was then obtained by subtracting the absolute cognitive discrepancy score from the absolute affective discrepancy score. Thus, every participant was left with one score that represented their attitude basis on the attitude basis continuum. Positive values on the attitude basis continuum represented affectively-based attitudes, with larger positive values indicating greater affective influence on the overall attitude. Negative values on the attitude basis
continuum represented cognitive attitudes, with larger negative values indicating greater
cognitive influence on the overall attitude. The attitude basis scores were mean centered, and an
interaction term between attitude basis and condition was created by multiplying attitude basis
score with condition. This procedure was performed for both attitudes (home) and attitudes
(work).

Two hierarchical regressions were conducted, one with attitude change (home) as the
dependent variable and the other with attitude change (work) as the dependent variable. The
corresponding mean-centered attitude basis scores and condition were included as predictors in
the first step, and the interaction term as the predictor in the second step. Significant interactions
were followed-up with simple slopes analysis.
3.5 References


Chapter 4

Results

4.1 Data Cleaning

All raw data were checked for outliers, which were defined as “any score corresponding to a $z$-score $\geq \pm 3.29$”. The number of outliers in the pre-message variables ranged from one to seven outliers per variable, while two to six outliers were found in the post-message variables. One outlier was found in the viewing time variable. Outliers were transformed into scores that were equal to a $z$-score of $\pm 3$. The intention change and attitude change variables were created using raw unadjusted scores. After creating the change variables by subtracting the raw pre-message scores from the raw post-message scores, the change variables were checked for outliers. Six to eight outliers were found and they were transformed into scores that were equal to a $z$-score of $\pm 3$. Correcting the outliers helped reduce the skewness and kurtosis of the distributions, however, skewness and kurtosis measures revealed that the majority of variables were still negatively skewed and either positively or negatively kurtotic. Skewness and kurtosis were slightly more pronounced in the post-message variables. Reverse score transformations for negatively skewed distributions were not successful in normalizing some variables, including intentions and attitudes. Field (2009) indicates that, in analyses comparing means (e.g., ANCOVA), if one variable is transformed, the rest must also be transformed. However, because some variables were not normalized even after transformations were applied and because the ANOVA test is robust against violations of normality, regardless of inequalities in sample size (Field, 2009), none of the variables were transformed for inclusion in the final models.
4.2 Participant Characteristics

MTurk requires requesters to indicate the specific number of workers they wish to recruit to complete the task. We requested 298 based on our sample size calculation plus a 12-15% cushion for attrition. In total, 2804 individuals pressed on the study link and were directed to the study. Of these, 1107 were screened out immediately after being directed to the study, which suggests that they did not meet geographical criteria as determined by IP address. Additionally, six workers were screened out because they did not select “Canada” or “United States” as the country in which they lived, 30 because they indicated an inability to read, write, and understand English, 19 because of an inability to stand and walk independently, 61 because they were not between the ages of 18 and 64, 361 because they were retired, unemployed, on leave from work, or would be on leave from work two weeks after study completion, 214 because they worked at home or were unemployed (employment was reassessed), 534 because they equally, mostly, or always stand or walk around at work, and 45 because they were enrolled as students in an educational institution. Of those remaining, 347 provided consent to participate in the study, however, only 292 actually completed the study and submitted their results. On MTurk, 298 workers submitted a code, but not all codes were valid. One of the 292 participants had completed the pre-test and was excluded from the analysis. Therefore, the final study sample was 291, which was sufficient to detect a large effect as per the sample calculation.

4.3 Manipulation Checks

One-way ANOVAs were used to compare participants from the three conditions on the manipulation check items and post-hoc Games-Howell tests for unequal group sizes were used to explore significant differences between participants from the three conditions. Results are displayed in Table 4.1. In comparison to participants in the control condition, participants in the
affective condition had significantly more favourable ratings on all manipulation check questions ($p$s < 0.01), and the cognitive condition had significantly greater ratings on all the manipulation checks ($p$s < 0.01), with the exception of reliance on emotion to evaluate the message. Participants from the affective and cognitive conditions differed significantly on the extent to which they found their respective messages to be informative ($p$ < 0.05, $\eta^2$ = 0.04, $d$ = 0.42), with those in the cognitive condition providing higher ratings, and on the extent to which they agreed that the message highlighted the emotions/feelings associated with taking breaks from sitting, with the affective condition providing higher ratings ($p$ < 0.001, $\eta^2$ = 0.03, $d$ = 0.36). The trends of the means on the affect- and cognition-based manipulation check questions were in the expected direction (i.e., participants from the affective condition had higher ratings on the affect-based questions and vice-versa for participants in the cognitive condition), except for the emotion felt check, which was the same for the two experimental conditions.
Table 4.1. Means and standard deviations for the manipulation check variables, by condition

<table>
<thead>
<tr>
<th>Variable</th>
<th>Control Mean (SD)</th>
<th>Condition Cognitive Mean (SD)</th>
<th>Affective Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Believability</td>
<td>5.51&lt;sup&gt;a,b&lt;/sup&gt; (1.46)</td>
<td>6.33&lt;sup&gt;a&lt;/sup&gt; (0.89)</td>
<td>6.11&lt;sup&gt;b&lt;/sup&gt; (0.97)</td>
</tr>
<tr>
<td>Credibility</td>
<td>5.40&lt;sup&gt;a,b&lt;/sup&gt; (1.52)</td>
<td>6.34&lt;sup&gt;a&lt;/sup&gt; (0.95)</td>
<td>6.10&lt;sup&gt;b&lt;/sup&gt; (0.98)</td>
</tr>
<tr>
<td>Informative</td>
<td>5.38&lt;sup&gt;a,b&lt;/sup&gt; (1.38)</td>
<td>6.45&lt;sup&gt;a,c&lt;/sup&gt; (0.86)</td>
<td>6.06&lt;sup&gt;b&lt;/sup&gt; (1.00)</td>
</tr>
<tr>
<td>Emotion felt</td>
<td>1.94&lt;sup&gt;a,b&lt;/sup&gt; (1.14)</td>
<td>2.64&lt;sup&gt;a&lt;/sup&gt; (1.00)</td>
<td>2.64&lt;sup&gt;b&lt;/sup&gt; (0.95)</td>
</tr>
<tr>
<td>Considered feelings/emotions</td>
<td>2.89&lt;sup&gt;a,b&lt;/sup&gt; (1.05)</td>
<td>3.57&lt;sup&gt;a&lt;/sup&gt; (1.02)</td>
<td>3.62&lt;sup&gt;b&lt;/sup&gt; (0.97)</td>
</tr>
<tr>
<td>Rational reasons</td>
<td>3.15&lt;sup&gt;a,b&lt;/sup&gt; (1.08)</td>
<td>4.33&lt;sup&gt;a&lt;/sup&gt; (0.70)</td>
<td>4.08&lt;sup&gt;b&lt;/sup&gt; (0.80)</td>
</tr>
<tr>
<td>Relied on emotion</td>
<td>2.10&lt;sup&gt;b&lt;/sup&gt; (1.16)</td>
<td>2.44&lt;sup&gt;b&lt;/sup&gt; (1.07)</td>
<td>2.49&lt;sup&gt;b&lt;/sup&gt; (1.07)</td>
</tr>
<tr>
<td>Highlighted feelings/emotion</td>
<td>4.13&lt;sup&gt;a,b&lt;/sup&gt; (1.51)</td>
<td>5.12&lt;sup&gt;a,c&lt;/sup&gt; (1.47)</td>
<td>5.89&lt;sup&gt;b&lt;/sup&gt; (1.52)</td>
</tr>
<tr>
<td>Relied on rationality</td>
<td>3.04&lt;sup&gt;a,b&lt;/sup&gt; (1.20)</td>
<td>4.08&lt;sup&gt;a&lt;/sup&gt; (0.81)</td>
<td>3.83&lt;sup&gt;b&lt;/sup&gt; (0.90)</td>
</tr>
<tr>
<td>Thoughts about benefit</td>
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<td>5.83&lt;sup&gt;a&lt;/sup&gt; (1.16)</td>
<td>5.58&lt;sup&gt;b&lt;/sup&gt; (1.31)</td>
</tr>
</tbody>
</table>

Note. Means in a row that share the same superscripted letters were significantly different from each other based on Games-Howell post-hoc tests.

<sup>a</sup>Significant difference between control and cognitive groups (p<0.05)
<sup>b</sup>Significant difference between control and affective groups (p<0.05)
<sup>c</sup>Significant difference between cognitive and affective groups (p<0.05)
4.4 Pre-Message Characteristics and Differences Between Domains

One-way ANOVAs and Chi-squared tests were conducted to ensure that participant randomization was effective. The ANOVAs indicated that there were no pre-message differences between conditions on any of the dependent variables or the covariates (\( p > 0.05 \)). Chi-squared results (Table 4.2) revealed no differences between the conditions on any of the demographic variables (\( p > 0.05 \)) except for age (\( p = 0.043 \)) and gender (\( p = 0.031 \)).

Table 4.2. Demographic characteristics

<table>
<thead>
<tr>
<th>Variables</th>
<th>Control ((n=93))</th>
<th>Conditions ((n=100))</th>
<th>Affective ((n=98))</th>
</tr>
</thead>
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<td>Age ((M±SD))</td>
<td>37.8±10.3</td>
<td>35.3±8.8</td>
<td>38.8±10.5</td>
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<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Male</td>
<td>43 (46.2)</td>
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<td>54 (55.1)</td>
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<tr>
<td>Female</td>
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<td>43 (43.9)</td>
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<td>0 (0.0)</td>
<td>1 (1.02)</td>
</tr>
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<td>Satisfactory</td>
<td>39 (41.9)</td>
<td>46 (46.0)</td>
<td>35 (35.7)</td>
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<tr>
<td>Very good</td>
<td>41 (44.1)</td>
<td>38 (38.0)</td>
<td>121 (41.6)</td>
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<tr>
<td>Excellent</td>
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<td>10 (10.0)</td>
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<tr>
<td>Race</td>
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<td>75 (76.5)</td>
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<td>4 (4.0)</td>
<td>14 (14.3)</td>
</tr>
<tr>
<td>Hispanic</td>
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<td>2 (2.04)</td>
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<td>5 (5.10)</td>
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<td>1 (1.02)</td>
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<td>University</td>
<td>Masters/professional degree</td>
</tr>
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<td>1 (1.02)</td>
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**Employment Status**

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<th>Masters/professional degree</th>
<th>Doctorate degree</th>
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<td>One full-time job</td>
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<td>88 (88.0)</td>
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<td>7 (7.0)</td>
<td>3 (3.06)</td>
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<td>Two or more full-time jobs</td>
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<td>4 (4.0)</td>
<td>2 (2.04)</td>
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<td></td>
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<tr>
<td>Two or more part-time jobs</td>
<td>3 (3.2)</td>
<td>1 (1.0)</td>
<td>5 (5.10)</td>
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</table>

**Employment Industry**

<table>
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<tr>
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<th>University</th>
<th>Masters/professional degree</th>
<th>Doctorate degree</th>
<th>Unknown</th>
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</thead>
<tbody>
<tr>
<td>Goods-producing</td>
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<td>11 (11.0)</td>
<td>8 (8.16)</td>
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<td>Service-providing</td>
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<td>89 (89.0)</td>
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</table>

**Income ($)**

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<th>University</th>
<th>Masters/professional degree</th>
<th>Doctorate degree</th>
<th>Unknown</th>
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<tr>
<td>Less than 25,000</td>
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<td>12 (12.0)</td>
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<td>7 (7.14)</td>
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<td>35,000 – 49,999</td>
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<td>19 (19.0)</td>
<td>15 (15.3)</td>
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<tr>
<td>50,000 – 74,999</td>
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<td>24 (24.0)</td>
<td>28 (28.6)</td>
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</tr>
<tr>
<td>75,000 – 99,999</td>
<td>10 (10.8)</td>
<td>11 (11.0)</td>
<td>20 (20.4)</td>
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</tr>
<tr>
<td>100,000 – 149,999</td>
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<td>14 (14.0)</td>
<td>15 (15.3)</td>
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<td></td>
</tr>
<tr>
<td>150,000 – 199,999</td>
<td>5 (5.4)</td>
<td>6 (6.0)</td>
<td>1 (1.02)</td>
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<td></td>
</tr>
<tr>
<td>200,000 or more</td>
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<td>1 (1.02)</td>
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<td></td>
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<tr>
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<td>0 (0.0)</td>
<td>1 (1.02)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note: n=number of participants in each category per condition. Mean age and standard deviation (in years) are reported.

Table 4.3. displays the scores for sitting habit, break frequency, and sitting time at home and at work, by condition, which were all assessed at only one time point (pre-message). Habit strength was significantly stronger ($F(1, 288)=68.45, p=0.000, \eta^2=0.033, d=0.37$), and sitting time was much higher ($F(1, 288)=113.286, p=0.000, \eta^2=0.162, d=0.88$) at work than at home. Break frequency did not differ significantly between domains, although it approached significance ($p=0.06$). A condition*domain interaction was not observed for any of the three aforementioned variables ($ps>0.05$).
The pre- and post-message scores for TPB constructs and meta-cognitive attitudes at home and at work, which were measured at both time points, are presented in Table 4.4. On average, the scores on the TPB constructs were high at pre-message, with condition means ranging from 5.77 to 6.12 (SD range=0.85-1.42; Md range=6.00-7.00). They were also high at post-message; condition means ranged from 5.86 to 6.35 (SD range=0.71-1.34; Md range=6.00-7.00). Of attitudes and intentions at home and at work, intentions (home) were the lowest and attitudes (work) the highest.

Condition means for pre-message meta-cognitive attitudes ranged from 3.68 to 4.26 (SD range=1.65-1.96; Md range=4.00-5.00). Post-message meta-cognitive attitude condition means ranged from 3.79 to 4.59 (SD range=1.73-2.01; Md range=4.00-5.00). Affective attitudes (home) and affective meta-cognitive attitudes (home) were weakly, negatively correlated ($r=-0.14$, $p=0.02$), while cognitive attitudes (work) and cognitive meta-cognitive attitudes (work) were weakly, positively correlated ($r=-0.26$, $p<0.001$). Affective attitudes (work) and affective meta-
cognitive attitudes, as well as cognitive attitudes (work) and cognitive meta-cognitive attitudes, were not significantly correlated ($ps>0.05$).

At pre-message, PBC ($F(1, 288)=28.96, p=0.00, \eta^2=0.024, d=0.31$) and social norms ($F(1, 288)=19.92, p<0.001, \eta^2=0.015, d=0.25$) were significantly higher at home than at work. However, the opposite was seen for affective, cognitive, and overall attitudes, and intentions; affective attitudes were stronger at work than at home ($F(1, 288)=21.42, p<0.001, \eta^2=0.032, d=0.36$), as were cognitive attitudes ($F(1, 288)=18.77, p=0.000, \eta^2=0.013, d=0.23$), overall attitudes ($F(1, 288)=10.49, p<0.001, \eta^2=0.008, d=0.18$), and intentions ($F(1, 288)=8.87, p=0.003, \eta^2=0.006, d=0.15$). There was no difference between the two domains for affective and cognitive meta-cognitive attitudes ($ps> 0.05$). A condition*domain interaction was not observed for any of the eight variables ($ps> 0.05$).

**4.5 Change Scores**

Of the three conditions, participants from the affective condition, followed by those from the cognitive and control conditions, successively, displayed the greatest change on the following constructs: overall attitudes (work), cognitive attitudes (home and work), intentions (home and work), social norms (home), and cognitive meta-cognitive attitudes (home). Participants from the affective and control conditions showed the same degree of change in overall attitudes (home), however in opposite directions: change in the affective condition was positive and change in the control was negative. Those from the affective condition also displayed greater change in PBC (home) than participants in the other two conditions, who showed the same degree of change. Finally, participants from the affective condition showed the greatest change on affective meta-
cognitive attitudes (work), followed by those in the control and cognitive conditions, successively. However, the change in the affective condition was negative, while the change in the other two conditions was positive.

Participants in the cognitive condition, followed by those in the affective and control conditions, displayed the greatest degree of change on the following constructs: affective attitudes (home and work), PBC (work), and cognitive meta-cognitive attitudes (work). Those in the cognitive condition also showed the greatest degree of change on affective meta-cognitive attitudes, followed by participants from the control condition and from the affective condition, in that order. Only change in the cognitive condition was positive.

Univariate ANOVAs suggest that condition differences in the change in affective attitudes (home), affective and cognitive meta-cognitive attitudes (home), and PBC and social norms at home and at work were not significant ($p$s $> 0.05$). There were, however, significant differences between the conditions on affective attitude change (work; $F(1, 288)=3.05, p=0.049$), affective meta-cognitive attitude change (work; $F(1, 288)=3.37, p=0.036$), cognitive meta-cognitive attitude change (work; $F(1, 288)=8.081, p<0.001$), and cognitive attitudes towards breaks at home ($F(1, 288)= 7.82, p<0.001$) and at work ($F(1, 288)=4.05, p=0.018$).

Repeated-measures ANOVAs indicate that the difference in the degree of change in social norms and the overall, structural, and meta-cognitive attitudes between domains was not significant ($p$s $> 0.05$). In contrast, the degree of change in PBC at work significantly exceeded the degree of change at home ($F(1, 288)=4.94, p=.027, \eta^2 =.006, d=.16$). There was no change*condition interaction for any of these variables ($p$s$> 0.05$). Research question two explores differences in attitude and intention change across conditions and domains and will be discussed later in this chapter.
Table 4.4. Pre- and post-message means, standard deviations, and medians for Theory of Planned Behaviour constructs and meta-cognitive attitudes at home and at work

<table>
<thead>
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<th>Time Variables (domain)</th>
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<th></th>
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<th></th>
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</tr>
</thead>
<tbody>
<tr>
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<td>Post</td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
<td>Post</td>
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<td>Post</td>
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<td>M (SD)</td>
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<td>M (SD)</td>
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Table 4.5. Change scores for Theory of Planned Behaviour constructs at home and at work and corresponding p-value for condition differences

<table>
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<tr>
<th>Variables (domain)</th>
<th>Control M (SD)</th>
<th>Conditions Cognitive M (SD)</th>
<th>Affective M (SD)</th>
<th>p (Control vs Cognitive)</th>
<th>p (Control vs Affective)</th>
<th>p (Cognitive vs Affective)</th>
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<td>Home</td>
<td>-0.17 (0.65)</td>
<td>0.02 (.79)</td>
<td>0.17 (0.66)</td>
<td>0.937</td>
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<td>0.20 (0.58)</td>
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<td>0.074</td>
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<tr>
<td>Home</td>
<td>0.06 (0.54)</td>
<td>0.17 (0.59)</td>
<td>0.15 (0.48)</td>
<td>0.174</td>
<td>0.284</td>
<td>0.773</td>
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<td>Work</td>
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<td>0.10 (0.42)</td>
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<tr>
<td>Home</td>
<td>-0.06(a,b) (0.53)</td>
<td>0.17(a) (0.65)</td>
<td>0.26(b) (0.52)</td>
<td>0.006</td>
<td>0.000</td>
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<tr>
<td>Home</td>
<td>-0.02(b) (0.90)</td>
<td>0.11 (0.75)</td>
<td>0.30(b) (0.74)</td>
<td>0.287</td>
<td>0.004</td>
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<td>Work</td>
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<td>0.13 (0.76)</td>
<td>0.26 (.72)</td>
<td>0.717</td>
<td>0.090</td>
<td>0.174</td>
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<td>Perceived Behavioural Control</td>
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<tr>
<td>Home*</td>
<td>0.10 (0.93)</td>
<td>0.10 (0.86)</td>
<td>0.13 (0.68)</td>
<td>0.964</td>
<td>0.770</td>
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<td>Work*</td>
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<td>0.24 (0.93)</td>
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<td>0.491</td>
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<tr>
<td>Home</td>
<td>0.04 (0.77)</td>
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<tr>
<td>Home</td>
<td>-0.08 (1.22)</td>
<td>0.10 (1.16)</td>
<td>-0.02 (1.20)</td>
<td>0.307</td>
<td>0.932</td>
<td>0.262</td>
</tr>
<tr>
<td>Work</td>
<td>0.13(b) (0.92)</td>
<td>0.11(c) (1.02)</td>
<td>-0.22(b,c) (1.18)</td>
<td>0.842</td>
<td>0.021</td>
<td>0.032</td>
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<tr>
<td>Home</td>
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<td>0.29 (1.18)</td>
<td>0.33 (1.44)</td>
<td>0.167</td>
<td>0.116</td>
<td>0.839</td>
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<tr>
<td>Work</td>
<td>-0.15(a,b) (1.08)</td>
<td>0.42(a) (1.07)</td>
<td>0.38(b) (1.11)</td>
<td>0.000</td>
<td>0.001</td>
<td>0.796</td>
</tr>
</tbody>
</table>

Note. *Significant difference (p<0.05) between home and work
\(a\)Significant differences between the control and cognitive conditions (p<0.05)
\(b\)Significant differences between the control and affective conditions (p<0.05)
\(c\)Significant differences between the cognitive and affective conditions (p<0.05)
4.6 Message Effectiveness

Figures 4.1 and 4.2 present the results for attitude and intention change (home and work) by condition and domain.

4.6.1 Attitude Change at Home

A univariate ANCOVA controlling for affective meta-cognitive attitudes was conducted to explore condition differences in attitude change (home). In contrast to H1, which predicted that the participants in the affective condition would exhibit more change in attitudes (home) than the cognitive and control conditions, there was no significant effect of condition on the degree of change in attitudes (home; $F(2, 287)=2.093, p=0.125$). Affective meta-cognitive attitudes were negatively related to attitudes towards taking breaks at home ($F(2, 287)=4.236, p=0.003, B=-0.072$), indicating that the less participants believed that their overall attitude was based on affect, the more likely they were to exhibit a greater degree of overall attitude change.

4.6.2 Attitude Change at Work

A univariate ANCOVA controlling for PBC, social norms, and break frequency was conducted to explore condition differences in attitude change (work). There was no significant effect of condition on attitude change (work; $F(2, 287)=1.797, p=0.168$), thus, H1 was not supported. PBC was negatively related to attitudes to take breaks at home, $F(2, 287)=4.286, p=0.039, B=-0.066$, indicating that participants with lower PBC were more likely to exhibit greater attitude change (work) than those with higher PBC.
4.6.3 Intention Change at Home

A univariate ANCOVA controlling for break frequency was conducted to explore condition differences in intention change (home). There was a significant effect of condition on the degree of change in intentions at home \((F(2,287)=4.215, p=0.016)\). Planned contrasts indicated a significant difference between the control and affective conditions \((p=0.004, 95\% \text{ CI } [-0.556, -0.103], \eta^2 =0.037, d=0.39)\), such that participants in the affective condition showed greater change than did the participants in the control condition. Planned contrasts also indicated that the difference between the affective and cognitive conditions approached significance \((p=0.068, 95\% \text{ CI } [-0.430, 0.016], \eta^2 =0.015, d=0.25)\), with the participants in the affective condition showing more change. Thus, H1 was partially supported. There were no significant differences between the control and the cognitive conditions \((p=0.287, 95\% \text{ CI } [-0.103, 0.347])\). Break frequency was negatively related to intentions (home; \(F(2, 287)=4.851, p=0.028, B=-\)
0.069). This indicates that those who perceived themselves as taking less breaks displayed greater change in intention then did those who perceived that they take more breaks.

4.6.4 Intention Change at Work

A univariate ANCOVA controlling for pre-message intentions at work was conducted to explore condition differences in intention change (work). In contrast to H1, there was no significant effect of condition on the degree of change in intentions (work; $F(2,287)=1.624$, $p=0.199$). Pre-message intentions (work) were negatively related to intentions to take breaks (home; $F(2, 287)=36.303$, $p<0.001$, $B=-0.227$), suggesting that participants who had lower pre-message intentions displayed greater levels of change than those who had higher pre-message intentions.

![Figure 4.2. Mean change in intentions at home and at work across study conditions. *$p<0.05$](image)
4.7 Change between Domains (Home and Work)

4.7.1 Attitudes

A repeated measures ANOVA conducted to determine whether there was a significant difference between home and work on the degree of attitude change, revealed no significant differences ($p=0.101$). Similarly, there was no significant change*condition interaction ($p=0.606$).

4.7.2 Intentions

A repeated measures ANOVA exploring differences in the degree of change in participant intentions between home and work showed no significant difference ($p=0.644$). Likewise, there was no significant change*condition interaction ($p=0.546$).

4.8 Matching/Mismatching Effects (Home)

A hierarchical regression was conducted with attitude change at home as the dependent variable, and attitude basis, condition, and the attitude basis-condition interaction term as predictors. We found that attitude basis significantly predicted attitude change ($\beta=-1.27$, $t(197)=-4.0$, $p<0.001$), such that attitudes that were more cognitively-based showed more change than attitudes that were more affectively-based. Condition, however, did not predict change in attitudes at home ($p=0.17$). Finally, the interaction term ($\beta=0.73$, $t(197)=-3.71$, $p<0.001$) was a significant predictor of attitude change. Follow-up simple slopes analyses indicate that of participants with an affectively-based attitude, those who were exposed to an affective message had significantly greater positive attitude change compared to those who were exposed to a cognitive message ($\beta=0.51$, $t(197)=3.62$, $p<0.001$). However, there was no difference in response among participants with a cognitive attitude basis ($p=0.10$; Figure 4.3.).
Figure 4.3. Attitude change (home) as a function of attitude basis and message type. Means are depicted at -1 SD (cognitively-based attitudes) and +1 SD (affectively-based attitudes) on the attitude basis continuum.

4.9 Matching/Mismatching Effects (Work)

A hierarchical regression was conducted with attitude change at work as the dependent variable, and attitude basis, condition, and an attitude basis-condition interaction term as predictors. Results indicate that attitude basis significantly predicted attitude change at work ($\beta=-0.847$, $t(197)=-2.07$, $p=0.04$), such that attitudes that were more cognitively-based showed more change than attitudes that were more affectively-based. Neither condition ($p=0.76$) nor the attitude basis-condition interaction term ($p=0.078$) predicted attitude change (Figure 4.4.).
Figure 4.4. Attitude change (work) as a function of attitude basis and message type. Means are depicted at -1 SD (cognitively-based attitudes) and +1 SD (affectively-based attitudes) on the attitude basis continuum.
4.10 References

Chapter 5

Discussion

5.1 Message Effectiveness

There is a lack of understanding about what constitutes effective sedentary behaviour reduction/interruption messages. Given the high prevalence of sedentary behaviour among adults, it is imperative that we understand the types of messages that are most effective at motivating adults to reduce or break up their sitting time. The first research question explored and compared the effectiveness of affective, cognitive, and control messages on improving attitudes and intentions to take breaks from sitting at home and at work. In all four of the models tested (attitude change at home, attitude change at work, intention change at home, and intention change at work), participants in the affective message condition displayed the greatest change over time, followed by participants in the cognitive and control message conditions. However, only the difference in intention change (home) between the affective and control conditions was significantly different. Specifically, participants in the affective condition showed greater change in intentions to take breaks at home than participants in the control condition. Furthermore, while the affective condition participants’ intention change (home) was positive, the control condition participants’ change was negative, indicating that the control condition participants’ intentions (home) post-message were, on average, lower than they were pre-message (descriptive statistics confirm this). No significant differences emerged in any of the models between the affective and cognitive message conditions nor between the cognitive and control message conditions.

The superiority of the affective message over the control message in improving intentions to take breaks at home confirms previous research in the physical activity field. Connor and
colleagues (2010) found that university students who were exposed to an affective message showed greater improvements in physical activity three weeks after message exposure compared to those who were part of the no-message control group. Similarly, Sirriyeh and coauthors (2010) found that inactive adolescents who received affective SMS text messages to their phone promoting physical activity improved their engagement in physical activity significantly more than inactive adolescents who received neutral physical activity messages.

No differential effects on attitudes and intentions were found between affective and cognitive messages. This may be related to the temporal salience of the outcomes relayed in each of the messages. The affective message used in this study communicated affective proximal outcomes associated with breaks from sitting, while the cognitive message relayed the distal cognitive outcomes. Morris and colleagues (2015) suggest that affective messages are more effective when they convey proximal outcomes compared to when they convey distal outcomes. The opposite is true for cognitive messages; cognitive messages are more effective when they convey distal outcomes in comparison to proximal outcomes. In fact, in their 2015 study, these authors found that proximal affective messages and distal cognitive messages were more effective than distal affective messages and proximal cognitive messages, but that proximal affective and distal cognitive messages did not differ significantly. Therefore, a matching effect may exist between temporal salience and message type, such that affective messages are effective when framed in terms of proximal outcomes, and cognitive messages are most effective when framed in terms of distal outcomes, and that the degree of effectiveness of affective and cognitive messages may not differ greatly when each message is framed using the matching temporal frame. Future studies should investigate the interaction between message type and temporal salience in the context of breaks from sitting.
All significant covariates showed a negative relationship with the dependent variable in their respective models. However, all but pre-message intentions had very weak relationships with the dependent variable. Affective meta-cognitive attitudes were negatively associated with attitude change (home), PBC was negatively associated with attitude change (work), break frequency was negatively associated with intention change (home), and pre-message intentions were negatively associated with intentions (work).

Affective meta-cognitive attitudes displayed a weak negative relationship with attitude change (home), indicating that the less a participant believed that their attitudes were based on their emotions, the more likely they were to change their attitudes towards breaks at home. Participants who believe that their attitudes are based less on emotion may believe that they are “rational” people whose emotions do not play a role in their decision making and evaluations. After seeing a message that may seem credible, they may feel inclined to agree with it because a reliable or credible source is telling them that this information is true. Those who believe that their emotions do play a role in their decision making may, in fact, rely on their emotions to determine whether or not to accept potentially new information. According to the manipulation checks, participants in all groups had low ratings on the degree to which they felt any emotions while reading their respective message. The amount of emotion felt while reading the message may have had an influence on some participants more than on others, namely those who believe that their evaluations of an issue are partly determined by their emotions towards that issue. Thus, those who (partly) rely on their emotions to make evaluations or decisions may have consulted their emotions, consciously or unconsciously, to determine whether or not the information they were seeing in the message should be accepted and integrated into their existing attitude. Because they may not have felt a high degree of emotion, they may not have believed
that there was a need to change their opinion about breaks from sitting and this, in turn, may have resulted in a lower degree of change in attitudes towards breaks at home for those who rely on emotion.

The TPB recognizes that PBC and attitudes can influence each other in certain contexts (Ajzen, 1991). Our results indicate that the lower the pre-message PBC scores, the greater the change in attitudes (work). Participants with lower pre-message PBC may have had initially weaker attitudes than those with higher pre-message PBC. PBC (work) changed significantly after message exposure, and attitudes towards breaks at work may have changed with it. Participants who initially felt that they did not have much control over taking breaks at work may not have favoured breaks as much as those who felt they had more control over taking them at work. In fact, follow-up exploratory correlations indicated that there was a small significant positive relationship between pre-message PBC (work) and pre-message overall attitudes (work). After exposure to the message, which had simple, easy break suggestions, participants may have felt that they have more control over taking breaks, and as a result developed more favourable attitudes towards breaks at home, in turn, showing a significant, albeit very small, association with attitude change.

Earlier research has clearly demonstrated the link between past behaviour (break frequency) and intentions across several different contexts (Forward, 2009; Hagger, Chatzisarantis, & Biddle, 2001; Knussen, Yule, MacKenzie, & Wells, 2004; Norman, Conner, & Bell, 2000). Our results indicate that those who reported taking fewer breaks had greater change in intentions (home) than those who reported taking more breaks. It may be that participants who took fewer breaks saw a discrepancy between their behaviour and what was communicated and
recommended in the message, and therefore made the decision that they need to break up their sitting time more often, and thus, formed stronger intentions to take breaks at home.

Finally, those who reported lower intentions to take breaks at pre-message showed more change in intentions than those who reported higher intentions at pre-message. This could be related to a ceiling effect; participants who initially had high intentions to take breaks could not increase their intentions because their intentions were already high or at an extreme, while those who had lower intentions had more room for improvement. In addition, participants who may not have valued taking breaks before seeing the message may have been persuaded or may have become more motivated to take more breaks after seeing the message.

5.2 Change between Domains

The second research question sought to uncover whether significant differences existed between the degrees of attitude and intention change at home and at work. The results indicate that the participants' change in attitudes and intentions did not differ significantly between domains, even when condition was taken into account. The miniscule degree of change across all variables may have limited the chance of finding an effect between the domains, if one does exist. Because initial attitude and intention scores were high for both domains, with scores for work being higher than scores for home, there may not have been enough room for them to increase in either domain to the extent that any real differences that exist between the domains would actually be detected.

With regards to intentions in particular, it is not surprising that we did not find differences between domains. Change in two of the three constructs that predict intentions, namely attitudes and social norms, did not differ between domains. There were, however, differences between the degrees of change at home and at work in PBC. Participants showed a higher level of change in
PBC at work than they did at home across all three conditions. However, this significant change alone may not have been enough to stimulate differences in intention change between the domains. To investigate this, we conducted exploratory linear regressions for home and for work separately, in which intention change was entered as the dependent variable, and attitude, PBC, and social norm change as the predictors. Regression results revealed that attitude change (home) was the only significant predictor of intention change (home), while only social norm change (work) predicted intentions (work). Thus, it appears that PBC change had no influence on intention change in either of the domains. Hence, it is fitting that intention change does not differ between domains if the factors that exert the greatest influence on it did not show differences between the domains either.

5.3 Matching/Mismatching Effects

Past research indicates that the effects of affective and cognitive messages may differ depending on the underlying attitude basis of the message receiver. In other words, people with affective and cognitive attitude bases may respond differently to one message type compared to another. Thus, we investigated whether matching or mismatching effects existed between message type and attitude basis.

Results indicate that a relative matching effect was present for attitudes (home), such that participants with an affective attitude basis showed more attitude change in response to an affective message compared to a cognitive message, while those with a cognitive attitude basis did not show differential attitude change based on message seen. Relative matching effects are fairly common in the affective/cognitive persuasion literature (Fabrigar & Petty, 1999; Mayer & Tormala, 2010; See, Petty, & Fabrigar, 2008). For example, See and colleagues (2008) found that affective messages were more effective against attitudes that were primarily affective than were
cognitive messages, while cognitive messages were more effective against attitudes that were more cognitively-based than were affective messages.

A possible explanation for these results may be related to the affective/cognitive quality of the messages. The messages used in this study differed on an affective dimension but not on any cognitive dimensions. This means that the affective message contained comparable cognitive qualities to the cognitive message. This may have made it as equally appealing as the cognitive message to those with a cognitively-based attitude. The affective message, on the other hand, had significantly more affective qualities than the cognitive message, thus, it was more persuasive against affectively-based attitudes than was the cognitive message.

Despite the relative matching effect found for attitudes towards breaks at home, we found no matching effect for attitudes towards breaks at work. In other words, participants with an affectively-based attitude reacted similarly in response to an affective message as a cognitive message, as did participants with a cognitively-based attitude. The differential findings for work and home may be related to varying contextual factors. See and colleagues (2013), who also found no significant interaction between attitude basis and message type, indicated that one’s attitude basis may vary between domains depending on contextual factors, such as the saliency of affect or cognition, which could have an effect on persuasion and matching effects across domains. The TPB also recognizes that the influence of different factors (e.g., beliefs, social norms) is not uniform across domains. In other words, a factor may play a major role in one domain but have no influence in another. Thus, factors that facilitate or hinder attitude change at home in response to persuasive messages may be different from those that do so at work, or may do so to different degrees. For example, the degree of PBC over taking breaks or the social norms surrounding taking breaks at work may be different from those at home. Workers may have more
restrictions on when and how they take breaks at work, brought about by what is deemed acceptable by peers and superiors, but these same restrictions may not apply at home. At home, an individual may be less limited by interpersonal factors and may have more autonomy than in a social setting such as work.

Results also indicate that regardless of the message seen, persons with more cognitively-based attitudes showed greater attitude change (at home and at work) compared to those with affectively-based attitudes. According to Edwards (1990), cognitively-based attitudes are often harder to change than affectively-based attitudes because of their more complex nature. She postulated that while affectively-based attitudes are unidimensional (e.g. positive-negative), cognitively-based attitudes have multiple dimensions that are based on specific attributes of the object or issue (e.g. healthiness, efficiency). In order for a message to change cognitively-based attitudes, it would have to target the specific attribute upon which the attitude is based. The messages in this study may have done just that. The study messages communicated how physically and emotionally healthy breaks from sitting can be and listed several “easy” break ideas. It is possible that participants with cognitively-based attitudes had constructed their attitudes on how physically and emotionally (un)healthy breaks are, and/or on the degree of ease of taking breaks, making them congruent with the study messages. This congruency between the attribute(s) upon which the attitude is based and the messages is then likely to make the cognitively-based attitudes more susceptible to the message, leading to overall attitude change.

5.4 Limitations

There are several limitations that must be taken into account when interpreting the results of this research. First, the high pre-message scores on the main outcomes of intentions and attitudes suggest the presence of a ceiling effect, which likely left little room for improvement on
these constructs (Lammers & Badia, 2004). Thus, any potential alternative effects of the intervention may have been concealed. On a similar note, participants were only exposed to the message once. Research suggests a curvilinear relationship between message effectiveness and message repetition, such that message effectiveness is greater at moderate levels of repetition than at low and very high levels of repetition (Cacioppo & Petty, 1979, 1989; Campbell & Keller, 2003). Fabrigar and Petty (1999) indicate that it is hard to overwhelm the basis of a strong attitude with only one message exposure. Thus, this study is limited in that the participants were only exposed to the message once, which may not have been a strong enough dose to trigger any differential effects of the messages. Also, the timing of the assessment of attitudes and intentions (i.e., directly before and directly after message exposure) limits our ability to provide evidence for any long lasting message effects. Results of the manipulation checks point to another study limitation: the affective and cognitive messages differed only on the affective dimension (highlighting feelings/emotions). It would have been desirable for the messages to differ on both the affective and cognitive dimensions, as this would yield greater differentiation of the messages and allow for a more appropriate test of the effects of affective and cognitive information.

Finally, many of the covariates that were assessed could not be included in the attitude and intention models because they did not meet the assumptions of the ANCOVA test, limiting our ability to explore their effects.

5.5 Theoretical Applications

This study provides partial support for relative matching effects found in many studies in the attitude literature. Specifically, within the home domain, people with an affective attitude were likely to respond with greater attitude change when exposed to an affective message compared to a cognitive message, while people with a cognitively-based attitude did not show
differential attitude change based on message type. Conversely, findings on attitude change in the work domain revealed no matching/mismatching effect. This difference between domains supports See and colleagues’ findings (2013) and provides evidence that the presence of matching/mismatching effects may differ between domains.

Although researchers in the past speculated that affectively-based attitudes are more easily changed than cognitively-based attitudes (Edwards, 1990; Fabrigar & Petty, 1999), our study found evidence contrary to this. In fact, attitudes that were cognitively-based displayed greater attitude change than attitudes that were affectively-based in both the home and the work domains.

This study also corroborates Morris and coauthors’ findings that proximal affective messages and distal cognitive messages can be equally effective. While Morris and colleagues (2015) found this result for exercise behaviour, our results revealed this for attitudes and intentions to take breaks from sitting at home and at work.

5.6 Practical Applications

Study findings indicate that the affective message led to significantly greater changes in intentions towards breaks at home in comparison to the control message. Therefore, it may be worthwhile for public health practitioners or health advertising agencies to create messages that relay the affective associations with breaks from sitting. It may also be beneficial to develop messages that are tailored towards an individual’s attitude basis when targeting sitting at home. Finally, practitioners and professionals may be well advised to target adults whose attitudes and intentions towards taking standing breaks are not positive or strong, as this population may especially benefit from intervention.
5.7 Future Directions

Research in the future should expand on the findings from this study by testing affective and cognitive messages with participants whose attitudes and intentions are initially low, as this may allow for the exploration of a greater diversity of responses to the messages. In addition, future studies should test the effects of messages that differ on both the cognitive and affective dimensions, since the messages in this study differed affectively, but not cognitively. Researchers should further investigate the interaction between temporal salience and affective and cognitive messages to determine whether there is indeed, a matching effect between the type of message and the time frame of the content presented in the message, and the mechanisms through which this matching effect operates.

Studies should also test the impact of affective and cognitive messages on behaviour. While attitudes and intentions often predict behaviour indirectly and directly (Ajzen, 1991; Keer, Conner, Putte, & Neijens, 2013; Keer, Putte, & Neijens, 2010; Kiviniemi, Voss-Humke, & Seifert, 2007), the magnitude of change in these predictors does not always translate into the same magnitude of change in behaviour. In addition, assessment of attitudes, intentions, and even behaviour should be delayed longer (e.g., one week, two weeks) after message exposure in order to understand whether the impact of the messages is long term or only short lived.

It may also be valuable to investigate whether breaks from sitting are generally thought of affectively or cognitively, and whether this differs depending on the type of break or the domain in which breaks are taken. Exploring the attributes upon which people base their attitudes towards breaks, the emotions they associate with breaks, and the factors that influence break-taking behaviour and attitudes in different domains would be valuable for creating holistic and effective interventions. Finally, future studies may consider testing the impact of affective and
cognitive messages that are delivered via other forms of communication, including television or YouTube, or even on mobile applications.
5.8 References


Chapter 6
Summary and Conclusion

The purpose of this thesis was to investigate the influence of affective, cognitive, and control messages on working adults’ attitudes and intentions to take breaks from sitting at home and at work. It also sought to determine whether a match or a mismatch between attitude basis and message type would result in greater attitude change. The results indicate that affective messages are more effective than control messages in generating intention change (home), but they are no more effective than cognitive messages at generating attitude and intention change. Results also showed no significant difference in the degree of change in attitudes and intentions between home and work. Lastly, relative matching effects emerged for attitude change (home), such that participants with affectively-based attitude showed greater attitude change in response to an affective message compared to a cognitive message, while participants with cognitively-based attitudes showed no differential attitude change in response to the two messages. No matching/mismatching effects emerged for attitudes (work), suggesting that matching effects may not be uniform across domains, even when the target behaviour is the same.

Traditionally, cognitive models of behaviour change have been used to understand health behaviour. However, recently, there has been a growth in the number of studies investigating the importance of affect and emotion in motivating people to engage in health behaviour (Kiviniemi, Voss-Humke, & Seifert, 2007; Lawton, Conner, & McEachan, 2009; Rhodes, Fiala, & Conner, 2009). The investigation of the effects of affective messages in addition to the effects of cognitive messages in the context of sedentary behaviour interruption is not only a means of continuing the conversation and the exploration of the role of emotion and affect in the health
promotion research field, but also a means of (further) stimulating discussion around how health promoters can best promote reductions in prolonged sitting.
6.1 References


Appendix A

Pre-Test Messages

Control pre-tested message

Thank you for making it this far in the study! We strongly value your participation. The “next” button will automatically appear in 30 seconds. In the meantime, please take a moment to type out the following sentence into the text box below:

“Investigating Adult Movement is a study conducted on Amazon Mechanical Turk by researchers at Queen’s University, located in the Canadian province of Ontario.”
STAND UP and IMPROVE YOUR HEALTH STATUS

Taking breaks from sitting by standing up or walking around several times per day can reduce your risk of developing various negative health outcomes associated with sitting for long periods of time, such as weight gain, diabetes, and osteoporosis.

Not only can taking breaks help improve your overall health status, but they can also make your heart healthier, your bones stronger, and reduce your risk of obesity. Breaks give your body that break it needs to be healthy!

**Easy Ways to Break Up Your Sitting Time**

- Walk to colleagues’ office or family member’s room to talk to them instead of sending an electronic message
- Stand up while talking on the phone or during meetings
- Use a bathroom on another floor
- Stand up or walk around during a commercial break or after finishing a part of a book, report, TV show, or level of a video game
- Set a timer on your computer or phone to remind you to take a break

Get On Your Feet – Give Your Health a Boost!
STAND UP and FEEL HAPPY AND HEALTHY

Susan spends most of her day sitting down, and this makes her feel irritated, stiff, and tense. She decided to break up her sitting time by standing up or walking around several times per day…and she is so happy she did!

Not only does she enjoy a greater quality of life now that she is taking these breaks, but she also feels much more energetic and cheerful, and the tense feeling in her shoulders and back have disappeared! She feels healthy, happy, and ready to take on the world!

Easy Ways to Break Up Your Sitting Time

- Walk to colleagues’ office or family member’s room to talk to them instead of sending an electronic message
- Stand up while talking on the phone or during meetings
- Use a bathroom on another floor
- Stand up or walk around during a commercial break or after finishing a part of a book, report, TV show, or level of a video game
- Set a timer on your computer or phone to remind you to take a break

Get On Your Feet – Give Your Mood a Boost!

North American Physical Activity Association

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Appendix B
Pre-Test Instrument

Country

Which country do you live in?
Canada
United States of America
India
Other

English

Can you read, write, and understand English?
No
Yes

Mobility

Are you able to independently stand and walk?
No
Yes

Age

What is your age?
Under 18 years old
18-64 years old
65 years or older
Employment status

Are you currently retired, unemployed, on leave from work, or will be on leave from work over the next 2 weeks?
No
Yes

Primary Place of Work

Where is your primary place of work?
Outside the home
At home
I am unemployed

Sitting at Work

Please complete the following phrase: At work I am usually...
Always sitting
Mostly sitting
Equally sitting and standing/walking around
Mostly standing/walking around
Always standing/walking around

Student

Are you currently enrolled as a student in an educational institution?
No
Yes

Eligible

Thank you for filling out the eligibility questions! You are eligible to participate in the study.

Before moving on to complete the study, please read through the following Letter of Information and provide your informed consent.

Letter of Information and Consent Form

Letter of Information

Project Title: Reactions to a Health Advertisement

Principal Investigator: Hoda Gharib, MSc (candidate)
Co-Supervisor: Dr. Lucie Lévesque
Co-Supervisor: Dr. Monica Labarge
Queen's University
Queen's University
817g10@queensu.ca
levesquel@queensu.ca
mlabarge@business.queensu.ca

What is this study about? The purpose of this research study is to get an understanding of the reactions of adults to a health promotion message.

What will I be doing? As a participant, you will first read a through a message and then answer some questions about it and its components. In total, this study will take about 10-15 minutes of your time.

Is my participation voluntary? Yes, your participation is voluntary and you may withdraw from the study by closing the browser and returning the HIT at any time without consequence. Although we would appreciate that you take the time to answer all of the questions, you should not feel obliged to answer a question that you are not comfortable answering.
What will happen to my responses? Your responses to the questions will remain confidential and anonymous. When you submit the HIT, we will receive a file that includes your answers to the questionnaire items, your worker ID, and your IP address. This data will be stored safely on a password-protected computer and only the principal investigator and her supervisors will have access to the data. If there is ever a need for other researchers to use the data, they will be asked to sign a confidentiality agreement. Your worker ID will be used solely for the purpose of compensating you and will thereafter be deleted along with your IP address. In no way will your worker ID and IP address be used to identify you as an individual. The data may be published in academic journals or presented at scientific conferences, however, presentation of this data will be in an aggregate form and you will never be identified as an individual. Finally, data will be retained securely for a minimum of five years.

Are there any risks associated with participating? No, there are no known or anticipated risks or harms associated with participation in this study.

Are there any benefits associated with participating? As a participant in this study, you are helping researchers understand how adults perceive a health promotion message. This, in turn, will aid them in creating influential advertisements that will be used in a bigger study. You will also receive $0.25 for your time.

What if I have questions or concerns? Any questions about participation may be directed to Hoda Gharib at 8hg16@queensu.ca or co-supervisors, Dr. Lucie Lévesque at levesqul@queensu.ca or Dr. Monica Labarge at mlabarge@business.queensu.ca. Any ethical concerns about the study may be directed to the Chair of the Queen’s University General Research Ethics Board at chair.GREB@queensu.ca or +1-613-533-6081.

Can I get a summary of the results? Yes; when the study is completed and the data is analyzed, we would be happy to inform you of the results. Please contact Hoda Gharib at 8hg16@queensu.ca to request a copy of the research findings.

Thank you for your assistance in this research project. It is greatly appreciated.

This study has been granted clearance according to the recommended principles of Canadian ethics guidelines, and Queen’s policies.

You can download a copy of the Letter of Information by clicking on the secure download link below:

Letter of Information

Participant Statement of Consent:
"I have read the Letter of Information and have had any questions answered to my satisfaction. I understand that I will be participating in the study called "Reactions to a Health Advertisement" and I understand the procedures involved.

I understand that researchers will make every effort to ensure the confidentiality and anonymity of the data collected. I recognize that I am free to withdraw from the study without consequence. I am aware that if I have any questions, concerns, or complaints, I may contact the principle investigator, Hoda Gharib, at 8h13@queensu.ca, or the Chair of the General Research Ethics Board at chair.GREB@queensu.ca or +1-613-533-0081 at Queen's University."

If you understand and accept the above statement, please indicate your consent by selecting "Yes, I consent" and then proceed to click the "next" button at the bottom of the screen.

No, I do not consent.
Yes, I consent.

Health Status

Please complete the following phrase: I would rate my health status as...

Poor
Marginal
Satisfactory
Very good
Excellent

Cognitive Message

https://si.surveys.com/ControlPanelAPI.php?Action=GetSurveyForm&Preview=81-930T0Z0.6yi3eSLLzKv4UW0
These page timer metrics will not be displayed to the recipient.
First Click: 0 seconds
Last Click: 0 seconds
Page Submit: 0 seconds
Click Count: 0 clicks

Please read thoroughly over the message below, as you will be asked to answer questions related to the content of the message. The ‘next’ button will automatically appear after 30 seconds, but you may continue to read through the message for as long as you want before pressing the ‘next’ button.
STAND UP and IMPROVE YOUR HEALTH STATUS

Taking breaks from sitting by standing up or walking around several times per day can reduce your risk of developing various negative health outcomes associated with sitting for long periods of time, such as weight gain, diabetes, and osteoporosis.

Not only can taking breaks help improve your overall health status, but they can also make your heart healthier, your bones stronger, and reduce your risk of obesity. Breaks give your body that break it needs to be healthy!

**Easy Ways to Break Up Your Sitting Time**

- Walk to colleagues’ office or family member’s room to talk to them instead of sending an electronic message
- Stand up while talking on the phone or during meetings
- Use a bathroom on another floor
- Stand up or walk around during a commercial break or after finishing a part of a book, report, TV show, or level of a video game
- Set a timer on your computer or phone to remind you to take a break

Get On Your Feet – Give Your Health a Boost!

Please type out the title of the message in the following text box:
Affective Message

These page timer metrics will not be displayed to the recipient.
First Click: 0 seconds
Last Click: 0 seconds
Page Submit: 0 seconds
Click Count: 0 clicks

Please read thoroughly over the message below, as you will be asked to answer questions related to the content of the message. The 'next' button will automatically appear after 30 seconds, but you may continue to read through the message for as long as you want before pressing the 'next' button.
STAND UP and FEEL HAPPY AND HEALTHY

Susan spends most of her day sitting down, and this makes her feel irritated, stiff, and tense. She decided to break up her sitting time by standing up or walking around several times per day...and she is so happy she did!

Not only does she enjoy a greater quality of life now that she is taking these breaks, but she also feels much more energetic and cheerful, and the tense feeling in her shoulders and back have disappeared! She feels healthy, happy, and ready to take on the world!

Easy Ways to Break Up Your Sitting Time

- Walk to colleagues’ office or family member’s room to talk to them instead of sending an electronic message
- Stand up while talking on the phone or during meetings
- Use a bathroom on another floor
- Stand up or walk around during a commercial break or after finishing a part of a book, report, TV show, or level of a video game
- Set a timer on your computer or phone to remind you to take a break

Get On Your Feet – Give Your Mood a Boost!

Please type out the title of the message in the following text box:

Control

These page timer metrics will not be displayed to the recipient.
First Click: 0 seconds
Last Click: 0 seconds
#QuestionText, TimingPageSubmit#: 0 seconds
#QuestionText, TimingClickCount#: 0 clicks

Please read thoroughly over the message below, as you will be asked to answer questions related to the content of the message. The ‘next’ button will automatically appear after 30 seconds, but you may continue to read through the message for as long as you want before pressing the ‘next’ button.

Thank you for making it this far in the study! We strongly value your participation. The “next” button will automatically appear in 30 seconds. In the meantime, please take a moment to type out the following sentence into the text box below:

“Investigating Adult Movement is a study conducted on Amazon Mechanical Turk by researchers at Queen’s University, located in the Canadian province of Ontario.”

Please type out the bolded sentence in the message above into the following text box:
Attention checks - all conditions

What was the message about?

Whose logo appeared on the message?

Attention check - experimental

Two graphics appeared on the left side of the message - what was in those graphics?

Instruction

Please indicate your immediate response to the following items.

Ranking

Please rank the advertisement you just read using the following word pairs.

https://ls.qualtrics.com/controlPanel/r.php?action=GetSurveyPrintPreview&T=QOToGj3jzPELTUv4LW0
Emotions

Please indicate how much emotion you felt while reading the message.

None        A little       Some       Quite a bit       A lot

Reliance on emotion

Please indicate the extent to which you relied on emotion to evaluate this message.

Not at all       A little       Some       Quite a bit       A lot

Feelings

Please indicate the extent to which you agree with the following statement: "Reading this message made me consider the feelings that are associated with taking breaks from sitting."

Strongly Disagree   Disagree   Somewhat Disagree   Neither Agree nor Disagree   Somewhat Agree   Agree   Strongly Agree

Positive Feelings

Please indicate the extent to which you agree with the following statement: "This message highlights the positive feelings and emotions one would experience by taking breaks from sitting."

Strongly Disagree   Disagree   Somewhat Disagree   Neither Agree nor Disagree   Somewhat Agree   Agree   Strongly Agree

Reliance on rationality

https://s.qualtrics.com/ControlPanel/Rpx.php?action=GetSurveyPrintPreview&T=4QOTojG0jzzeH5LUL4ULW0
Please indicate the extent to which you relied on rationality to evaluate this message.

Not at all        A little        Some        Quite a bit      A lot

Thoughts

Please indicate the extent to which you agree with the following statement: "Reading this message made me think about the rational reasons to take a break from sitting."

Strongly Disagree    Disagree    Somewhat Disagree    Neither Agree nor Disagree    Somewhat Agree    Agree    Strongly Agree

Beneficial to take breaks

Please indicate the extent to which you agree with the following statement: "This message stimulated my thoughts about why it would be beneficial to take breaks from sitting."

Strongly Disagree    Disagree    Somewhat Disagree    Neither Agree nor Disagree    Somewhat Agree    Agree    Strongly Agree

Improvements

Do you have any suggestions for improving the advertisement that you would like to share with us?

Demographics

What is your exact age?
What is your gender?
Male
Female
Other

Which state/province do you live in?

What is your race?
White/Caucasian
African American/African Canadian
Hispanic
Asian
Native American/Indigenous
Pacific Islander
Other

What is the highest level of education you have completed?
No schooling
Elementary (Grades 1-8)
High school (Grades 9-12)
Community/Technical College
University (e.g. Undergraduate, Teacher’s College)
Master’s/Professional Degree
Doctorate Degree
Post-Doctorate Degree

What is your employment status?
One full-time job
One part-time job
Two or more full-time jobs
Two or more part-time jobs

In which industry are you currently employed?

What was your total household income over the past 12 months (before taxes)?

Less than $25,000
$25,000 to $34,999
$35,000 to $49,999
$50,000 to $74,999
$75,000 to $99,999
$100,000 to $149,999
$150,000 to $199,999
$150,000 to $199,999
$200,000 or more
Appendix C
Study Messages

Control Message

Thank you for making it this far in the study! We strongly value your participation. The “next” button will automatically appear in 30 seconds. In the meantime, please take a moment to type out the following sentence into the text box below:

“Investigating Adult Movement is a study conducted on Amazon Mechanical Turk by researchers at Queen’s University, located in the Canadian province of Ontario.”
STAND UP and IMPROVE YOUR HEALTH STATUS

Taking breaks from sitting by standing up or walking around at home and at work can reduce your risk of developing various negative health outcomes associated with sitting for long periods of time, such as weight gain, diabetes, back pain, and osteoporosis.

Studies show that adults who take breaks from sitting have better cardiovascular health than those who do not. For example, they have lower blood pressure and cholesterol levels, and are able to break down sugar in the blood more effectively after a meal. In turn, they are at a reduced risk of having a heart attack or stroke. Overall, breaks from sitting can make your heart healthier and bones stronger, reduce your risk of obesity, and improve your overall health.

Easy Ways to Break Up Your Sitting Time

☑ Walk to family member’s room or colleagues’ office to talk to them instead of sending an electronic message
☑ Use a bathroom on another floor
☑ Stand up or walk around:
  ☑ During a commercial break
  ☑ After finishing a part of a book, report, TV show, or level of a video game
☑ Stand up while talking on the phone, doing chores, or during meetings

Set a timer to remind yourself to take a 5 minute break from sitting every hour

Get On Your Feet – Give Your Health a Boost!

North American Physical Activity Association
Affective Message

**STAND UP and FEEL HAPPY AND HEALTHY**

Susan spends most of her day sitting down, and this makes her feel irritated, stiff, and tense. She decided to break up her sitting time by standing up or walking around several times per day at home and at work and she is so happy to see her life changing for the better one day at a time!

Not only does she enjoy a better quality of life now that she is taking these breaks, but she also feels much more energetic and joyful, and the tense feeling in her shoulders and back have disappeared! Even her friends and family have noticed a change. It warmed her heart when her family complimented her on how cheerful and optimistic she has become since she started taking breaks. Susan feels happy, healthy, and ready to take on the world!

**Easy Ways to Break Up Your Sitting Time**

- Walk to family member’s room or colleagues’ office to talk to them instead of sending an electronic message
- Use a bathroom on another floor
- Stand up or walk around:
  - During a commercial break
  - After finishing a part of a book, report, TV show, or level of a video game
- Stand up while talking on the phone, doing chores, or during meetings

**Get On Your Feet – Give Your Mood a Boost!**

Set a timer to remind yourself to take a 5 minute break from sitting every hour
Appendix D
Study Instrument

Worker ID

Thank you for your interest in our study!

Before completing the study, we require that you provide your Worker ID in the text box below. This will help determine your eligibility for the study. Workers who have participated in one of our previous studies are not eligible for this study and will not be compensated. Your Worker ID will never be used to identify you as an individual and will be used solely for the purpose of compensating you.

Country

Which country do you live in?
- Canada
- United States of America
- India
- Other

English

Can you read, write, and understand English?
- No
- Yes

Stand/Walk

Are you able to independently stand and walk?
- No
- Yes

Age

What is your age?
- Under 18 years old
- 18-64 years old
65 years or older

Employment Status

Are you currently retired, unemployed, on leave from work, or will be on leave from work over the next 2 weeks?

No
Yes

Place of work

Where is your primary place of work?

Outside the home
At home
I am unemployed

Work sitting

Please complete the following phrase: At work I am...

Always sitting
Mostly sitting
Equally sitting and standing/walking around
Mostly standing/walking around
Always standing/walking around

Student

Are you currently enrolled as a student in an educational institution?

No
Yes

You are eligible message

Thank you for filling out the eligibility questions! You are eligible to participate in the study.

Before moving on to complete the study, please read through the following Letter of Information and provide your informed consent.

Letter of Information and Consent Form

https://s.qualtrics.com/ControlPanelLayer.php?action=GetSurveyPrintPreview&T=5kA5sQvhy4OEGtbehGmKk0k
Letter of Information

Project Title: Investigating Adult Movement

Principal Investigator: Hoda Gharib, MSc (candidate)  Co-Supervisor: Dr. Lude Levesque  Co-Supervisor: Dr. Monica LeBarge
Queen's University  Queen's University  Queen's University
89ng16@queensu.ca  levesque@queensu.ca  mlabarge@business.queensu.ca

What is this study about? The purpose of this research study is to gain an understanding of adults' opinions about various levels of movement, what influences these opinions, and their movement patterns at home and at work.

What will I be doing? As a participant, you will complete three phases: 1) filling out a questionnaire; 2) reading a short message; 3) filling out a second questionnaire. In total, these three phases will take about 30-40 minutes of your time.

Is my participation voluntary? Yes, your participation is voluntary and you may withdraw from the study by closing the browser and returning the HIT at any time without consequence. Although we would appreciate that you take the time to answer all of the questions, you should not feel obligated to answer a question that you are not comfortable answering.

What will happen to my responses? Your responses to the questions will remain confidential and anonymous. When you submit the HIT, we will receive a file that includes your answers to the questionnaire items, your worker ID, and your IP address. This data will be stored safely on a password-protected computer and only the principal investigator and her supervisors will have access to the data. If there is ever a need for other researchers to use the data, they will be asked to sign a confidentiality agreement. Your worker ID will be used solely for the purpose of compensating you and will thereafter be deleted along with your IP address. In no way will your worker ID and IP address be used to identify you as an individual. The data may be published in academic journals or presented at scientific conferences, however, presentation of this data will be in an aggregate form and you will never be identified as an individual. Finally, data will be retained securely for a minimum of five years.

Are there any risks associated with participating? No, there are no known or anticipated risks or harms associated with participation in this study.

Are there any benefits associated with participating? As a participant in this study, you are aiding researchers in their quest to understand adults' movement patterns at home and at work as well as their opinion on various levels of movement and what influences these opinions. You will also receive $1.00 for your time.
What if I have questions or concerns? Any questions about participation may be directed to Hoda Gharib at 8h16g@queensu.ca or co-supervisors, Dr. Lucie Lévesque at levesqul@queensu.ca or Dr. Monica LaBarge at mlabarge@business.queensu.ca. Any ethical concerns about the study may be directed to the Chair of the Queen’s University General Research Ethics Board at chair.GREB@queensu.ca or +1-613-533-6081.

Can I get a summary of the results? Yes, when the study is completed and the data is analyzed, we would be happy to inform you of the results. Please contact Hoda Gharib at 8h16g@queensu.ca to request a copy of the research findings.

Thank you for your assistance in this research project. It is greatly appreciated.

This study has been granted clearance according to the recommended principles of Canadian ethics guidelines, and Queen’s policies.

You can download a copy of the Letter of Information by clicking on the secure download link below:

Letter of Information

Queen's UNIVERSITY

Participant Statement of Consent:
"I have read the Letter of Information and have had any questions answered to my satisfaction. I understand that I will be participating in the study called “Investigating Adult Movement” and I understand the procedures involved. I understand that researchers will make every effort to ensure the confidentiality and anonymity of the data collected. I recognize that I am free to withdraw from the study without consequence. I am aware that if I have any questions, concerns, or complaints, I may contact the principle investigator, Hoda Gharib, at 8h16g@queensu.ca, or the Chair of the General Research Ethics Board at chair.GREB@queensu.ca or 613-533-6081 at Queen’s University."

If you understand and accept the above statement, please indicate your consent by selecting “Yes, I consent” and the “next” button at the bottom of the screen.

No, I do not consent.
Yes, I consent.

Health Status

Please complete the following phrase: I would rate my health status as...

Poor
Section 1 Sitting habit

The following section will ask about your sitting patterns and about taking breaks from sitting.

**SITTING:** includes sitting on a chair, couch, stool, bed, ground, etc. It does not include sitting while doing exercise, such as sitting and using a stationary bicycle or sitting in a yoga position.

**A BREAK FROM SITTING:** involves switching from being in a seated position to standing up for a period of time before sitting back down again, or standing up and walking around for a period of time before sitting back down again. Some examples include standing up and stretching, standing up and walking to a printer or to get a drink/food, standing up to look out of a window, standing up while talking on the phone or to a friend/coworker/family member, etc.

**Sitting/breaking habit (home)**

For this section, think only about the sitting you do AT HOME.

On average, how many **hours per day** do you spend at home on a weekday and on a weekend? (Do not include time spent sleeping)

<table>
<thead>
<tr>
<th>Weekday</th>
<th>Weekend</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For the next two items, think about the amount of time you spend sitting AT HOME.

During the last 7 days, how much time did you spend sitting AT HOME on a WEEKDAY?

<table>
<thead>
<tr>
<th>Hours per day</th>
<th>Minutes per day</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

During the last 7 days, how much time did you spend sitting AT HOME on a WEEKEND?

<table>
<thead>
<tr>
<th>Hours per day</th>
<th>Minutes per day</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Please indicate the extent to which you agree with the following statements.

<table>
<thead>
<tr>
<th>Sitting at home is something I do automatically.</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Somewhat Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Somewhat Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sitting at home is something I do without having to consciously remember.</td>
<td>○ ○ ○ ○ ○ ○ ○ ○</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sitting at home is something I do without thinking.</td>
<td>○ ○ ○ ○ ○ ○ ○ ○</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sitting at home is something I start doing before I realize I am doing it.</td>
<td>○ ○ ○ ○ ○ ○ ○ ○</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sitting at home is something I have no need to think about doing.</td>
<td>○ ○ ○ ○ ○ ○ ○ ○</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sitting at home is something that belongs to my daily routine.</td>
<td>○ ○ ○ ○ ○ ○ ○ ○</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sitting at home is something I do frequently.</td>
<td>○ ○ ○ ○ ○ ○ ○ ○</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For the following item, please think only about the breaks from sitting that you take AT HOME.

Remember: A break from sitting involves switching from being in a seated position to standing up for a period of time before sitting back down again, or standing up and walking around for a period of time before sitting back down again.

Please indicate the extent to which you agree with the following statements.

<table>
<thead>
<tr>
<th>Talking breaks from sitting at home is something that belongs to my daily routine.</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Somewhat Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Somewhat Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Talking breaks from sitting at home is something I do frequently.</td>
<td>○ ○ ○ ○ ○ ○ ○ ○</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sitting/breaking habit (work)

For the following section, think only about the sitting you do AT WORK.

On average, how many hours per day do you spend at work?

Hours

For the next two items, think about the amount of time you spend sitting at work.

During the last 7 days, how much time did you spend sitting AT WORK?
Please indicate the extent to which you agree with the following statements.

<table>
<thead>
<tr>
<th>Sitting at work is something I do automatically.</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Somewhat Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Somewhat Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sitting at work is something I do without having to consciously remember.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Sitting at work is something I start doing before I realize I am doing it.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Sitting at work is something I have no need to think about doing.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Sitting at work is something that belongs to my daily routine.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Sitting at work is something I do frequently.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

For the following item, please think only about the breaks from sitting that you take AT WORK.

**Remember:** A break from sitting involves switching from being in a seated position to standing up for a period of time before sitting back down again, or standing up and walking around for a period of time before sitting back down again.

Please indicate the extent to which you agree with the following statements.

<table>
<thead>
<tr>
<th>Taking a break from sitting at work is something that belongs to my daily routine.</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Somewhat Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Somewhat Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taking a break from sitting at work is something I do frequently.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

**Section 2 - PBC**

**Section 2**

The following questions will ask you about breaks from sitting at HOME and at WORK.

Please indicate the extent to which you agree with the following statements about taking breaks from sitting at home and at work.
Social Norms (home)

Please indicate the extent to which you agree with the following statements about breaks from sitting AT HOME.

Most people who are important to me would approve of me taking breaks from sitting at home.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Somewhat Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Somewhat Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Most people like me would take breaks from sitting at home.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Somewhat Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Somewhat Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Social Norms (work)

Please indicate the extent to which you agree with the following statements about breaks from sitting AT WORK.

Most people who are important to me at work would approve of me taking breaks from sitting at work.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Somewhat Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Somewhat Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Most people like me would take breaks from sitting at work.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Somewhat Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Somewhat Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
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</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Section 3 PA

Section 3

This section is about all the moderate-to-vigorous physical activities that you may have done in the last 7 days solely for recreation, sport, exercise, or leisure.

Moderate-to-vigorous physical activities are any activities that increase your heart rate and make you breathe and sweat heavier than when you are resting. This may include activities such as fast walking, doubles or singles tennis, riding a bicycle at a regular or fast pace, swimming at a regular or fast pace, running, aerobics, lifting weights, etc.

Please think only about the moderate-to-vigorous physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do moderate-to-vigorous physical activities in your leisure
How much time did you usually spend on one of those days doing moderate-to-vigorous physical activities in your leisure time?

Minutes

Section 4 Global Intentions

The following two questions are about breaks from sitting at home and at work.

Remember: A break from sitting involves switching from being in a seated position to standing up for a period of time before sitting back down again, or standing up and walking around for a period of time before sitting back down again.

Global Intentions (home)

Please indicate the extent to which you agree with the following statement.

I intend to take breaks from sitting at home over the next two weeks.

Global Intentions (work)

Please indicate the extent to which you agree with the following statement.

I intend to take breaks from sitting at work over the next two weeks.

Section 5 Structural Attitudes
The following section is about **breaks from sitting AT HOME**.

Please indicate your **immediate response** to each word pair in the following item.

I would describe my **OVERALL ATTITUDE** towards **taking breaks from sitting at HOME** as:

- Negative: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Unfavourable: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Bad: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Dislike: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Favourable: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Good: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Like: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

**Structural Attitudes - Feelings (home)**

Please indicate your **immediate response** to each word pair in the following item.

My **FEELINGS** about **taking breaks from sitting at HOME** are best described as:

- Unpleasant: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Hate: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Sad: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Negative: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Tense: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Dislike: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Angry: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Bored: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Unfavourable: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Disgusted: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Bad: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Sorrowful: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Pleasant: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Love: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Delighted: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Positive: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Calm: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Like: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Relaxed: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Excited: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Favourable: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Accepting: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Good: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Joyful: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

**Structural Attitudes - Thoughts (home)**

Please indicate your **immediate response** to each of word pair in the following item.

My **THOUGHTS** about **taking breaks from sitting at HOME** are best described as:

- Useless: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Foolish: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Bad: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Unsafe: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Harmful: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Dislike: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Useful: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Wise: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Good: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Safe: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Beneficial: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
- Like: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Meta-cognitive attitude - emotions (home)

Please indicate your immediate response to the following item.

To what extent do you think your attitude towards breaks from sitting at HOME is driven by your EMOTIONS?
- Not at all driven by my emotions
- Completely driven by my emotions

Meta-cognitive attitude - beliefs (home)

Please indicate your immediate response to the following item.

To what extent do you think your attitude towards breaks from sitting at HOME is driven by your BELIEFS?
- Not at all driven by my beliefs
- Completely driven by my beliefs

Structural Attitudes (Work)

The following section is about breaks from sitting AT WORK.

Please indicate your immediate response to each word pair in the following item.

I would describe my OVERALL ATTITUDE towards taking breaks from sitting at WORK as:

- Negative
- Unfavourable
- Bad
- Dislike
- Positive
- Favourable
- Good
- Like

Structural Attitudes - Feelings (work)

Please indicate your immediate response to each word pair in the following item.

My FEELINGS about taking breaks from sitting at WORK are best described as:

- Sad
- Delighted
Structural Attitudes - Thoughts (work)

Please indicate your immediate response to each word pair in the following item.

My THOUGHTS about taking breaks from sitting at WORK are best described as:

Meta-cognitive attitude - emotions (work)

Please indicate your immediate response to the following item.

To what extent do you think your attitude towards breaks from sitting at WORK is driven by your EMOTIONS?

Meta-cognitive attitude - beliefs (work)

Please indicate your immediate response to the following item.
To what extent do you think your attitude towards breaks from sitting at HOME is driven by your BELIEFS?

Not at all driven by my beliefs: [ ] [ ] [ ] [ ] [ ] [ ] [ ] Completely driven by my beliefs

Section 6 - Messages

Cognitive Message

These page timer metrics will not be displayed to the recipient.
First Click: 0 seconds
Last Click: 0 seconds
Page Submit: 0 seconds
Click Count: 0 clicks

Thank you for making it this far in the study! We strongly value your participation. Please take time to read through the message below. The "next" button will automatically appear after 30 seconds, but you may continue to read through the message for as long as you want before pressing the "next" button.
STAND UP and IMPROVE YOUR HEALTH STATUS

Taking breaks from sitting by standing up or walking around at home and at work can reduce your risk of developing various negative health outcomes associated with sitting for long periods of time, such as weight gain, diabetes, back pain, and osteoporosis. Studies show that adults who take breaks from sitting have better cardiovascular health than those who do not. For example, they have lower blood pressure and cholesterol levels, and are able to break down sugar in the blood more effectively after a meal. In turn, they are at a reduced risk of having a heart attack or stroke. Overall, breaks from sitting can make your heart healthier and bones stronger, reduce your risk of obesity, and improve your overall health.

Easy Ways to Break Up Your Sitting Time

✓ Walk to family member’s room or colleagues’ office to talk to them instead of sending an electronic message
✓ Use a bathroom on another floor
✓ Stand up or walk around:
  ✓ During a commercial break
  ✓ After finishing a part of a book, report, TV show, or level of a video game
✓ Stand up while talking on the phone, doing chores, or during meetings

Set a timer to remind yourself to take a 5 minute break from sitting every hour

Get On Your Feet – Give Your Health a Boost!

North American Physical Activity Association

Please type out the title of the message in the following text box:

https://s.qualtrics.com/ControlPanelAjax.php?action=GetSurveyPrintPreview&ID=Tg4h6e8To04hGmKr0k

14/32
Affective Message

These page timer metrics will not be displayed to the recipient.
First Click: 0 seconds
Last Click: 0 seconds
Page Submit: 0 seconds
Click Count: 0 clicks

Thank you for making it this far in the study! We strongly value your participation. Please take time to read through the message below. The “next” button will automatically appear after 30 seconds, but you may continue to read through the message for as long as you want before pressing the “next” button.
STAND UP and FEEL HAPPY AND HEALTHY

Susan spends most of her day sitting down, and this makes her feel irritated, stiff, and tense. She decided to break up her sitting time by standing up or walking around several times per day at home and at work and she is so happy to see her life changing for the better one day at a time!

Not only does she enjoy a better quality of life now that she is taking these breaks, but she also feels much more energetic and joyful, and the tense feeling in her shoulders and back have disappeared! Even her friends and family have noticed a change. It warmed her heart when her family complimented her on how cheerful and optimistic she has become since she started taking breaks. Susan feels happy, healthy, and ready to take on the world!

Easy Ways to Break Up Your Sitting Time

✔ Walk to family member’s room or colleagues’ office to talk to them instead of sending an electronic message
✔ Use a bathroom on another floor
✔ Stand up or walk around:
  ✔ During a commercial break
  ✔ After finishing a part of a book, report, TV show, or level of a video game
✔ Stand up while talking on the phone, doing chores, or during meetings

Get On Your Feet – Give Your Mood a Boost!

Set a timer to remind yourself to take a 5 minute break from sitting every hour

Please type out the title of the message in the following text box:

https://js.qualtrics.com/ControlPanel/Ajax.php?section=GetSurveyPrintPreview&T=5K4GcQhywQEOjpmGmKy0k
Control

These page timer metrics will not be displayed to the recipient.
First Click: 0 seconds
Last Click: 0 seconds
#QuestionText, TimingPageSubmit#: 0 seconds
#QuestionText, TimingClickCount#: 0 clicks

Please take time to read through the study message in the box below.

Thank you for making it this far in the study! We strongly value your participation. The “next” button will automatically appear in 30 seconds. In the meantime, please take a moment to type out the following sentence into the text box below:

“Investigating Adult Movement is a study conducted on Amazon Mechanical Turk by researchers at Queen’s University, located in the Canadian province of Ontario.”

Please type out the bolded sentence in the message above into the following text box:

Section 7 - Post_Global Intentions

Section 7

The following questions will ask about breaks from sitting.

Post_Global Intentions (home)
Please indicate the extent to which you agree with the following statement.

I intend to take breaks from sitting at home over the next two weeks.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Somewhat Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Somewhat Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Post_Global Intentions (work)**

Please indicate the extent to which you agree with the following statement.

I intend to take breaks from sitting at work over the next two weeks.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Somewhat Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Somewhat Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Post_Section 8 Structural Attitudes**

**Section 8**

The following section is about breaks from sitting AT HOME.

Please indicate your immediate response to each word pair in the following item.

I would describe my OVERALL ATTITUDE towards taking breaks from sitting at HOME as:

- Negative: ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ Positive
- Unfavourable: ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ Favourable
- Bad: ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ Good
- Dislike: ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ Like

**Post_Structural Attitudes - Feelings (at home)**

Please indicate your immediate response to each word pair in the following item.

My FEELINGS about taking breaks from sitting at HOME are best described as:

- Unpleasant: ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ Pleasant
- Hate: ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ Love
- Sad: ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ Delighted
- Negative: ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ Positive
Post_Structural Attitudes - Thoughts (at home)

Please indicate your **immediate response** to each of word pair in the following item.

My **THOUGHTS** about **taking breaks from sitting at HOME** are best described as:

<table>
<thead>
<tr>
<th>Tense</th>
<th>Calm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dislike</td>
<td>Like</td>
</tr>
<tr>
<td>Angry</td>
<td>Relaxed</td>
</tr>
<tr>
<td>Bored</td>
<td>Excited</td>
</tr>
<tr>
<td>Unfavourable</td>
<td>Favourable</td>
</tr>
<tr>
<td>Disgusted</td>
<td>Accepting</td>
</tr>
<tr>
<td>Bad</td>
<td>Good</td>
</tr>
<tr>
<td>Sorrowful</td>
<td>Joyful</td>
</tr>
</tbody>
</table>

Post_Meta-cognitive attitude - emotions (home)

Please indicate your **immediate response** to the following item.

To what extent do you think your **attitude towards breaks from sitting at HOME** is driven by your **EMOTIONS**?

*Not at all driven by my emotions* | *Completely driven by my emotions*
---|---

Post_Meta-cognitive attitude - beliefs (home)

Please indicate your **immediate response** to the following item.

To what extent do you think your **attitude towards breaks from sitting at HOME** is driven by your **BELIEFS**?

*Not at all driven by my beliefs* | *Completely driven by my beliefs*
Post_Structural Attitudes (work)

The following section is about breaks from sitting AT WORK.

Please indicate your immediate response to each word pair in the following item.

I would describe my OVERALL ATTITUDE towards taking breaks from sitting at WORK as:

- Negative
- Unfavourable
- Bad
- Dislike
- Positive
- Favourable
- Good
- Like

Post_Structural Attitudes - Feelings (work)

Please indicate your immediate response to each word pair in the following item.

My FEELINGS about taking breaks from sitting at WORK are best described as:

- Sad
- Bad
- Hate
- Unpleasant
- Negative
- Disgusted
- Dislike
- Sorrowful
- Bored
- Unfavourable
- Tense
- Angry
- Delighted
- Good
- Love
- Pleasant
- Positive
- Accepting
- Like
- Joyful
- Excited
- Favourable
- Calm
- Relaxed

Post_Structural Attitudes - Thoughts (work)

Please indicate your immediate response to each word pair in the following item.

My THOUGHTS about taking breaks from sitting at WORK are best described as:

- Unfavourable
- Negative
- Unhealthy
- Favourable
- Positive
- Healthy

https://k.qualtrics.com/ControlPanelAjax.php?action=GetSurveyPrintPreview&T=9K4SaQyht4Cqo6hGmKx0k
Post_Meta-cognitive attitude - emotions (work)

Please indicate your immediate response to the following item.

To what extent do you think your attitude towards breaks from sitting at WORK is driven by your EMOTIONS?

Not at all driven by my emotions

Completely driven by my emotions

Post_Meta-cognitive attitude - beliefs (work)

Please indicate your immediate response to the following item.

To what extent do you think your attitude towards breaks from sitting at HOME is driven by your BELIEFS?

Not at all driven by my beliefs

Completely driven by my beliefs

Section 9 - Specific Intentions

Section 9

Using the scale on the right, please rate how likely you are to engage in each of the specific types of breaks from sitting. Then, using the text box under each type of break from sitting, please elaborate on why you chose this rating for this type of break from sitting.

Walk to a colleague’s office/desk to talk to them instead of sending an electronic message:

Very

Unlikely

Unlikely

Somewhat

Unlikely

Neutral

Somewhat

Likely

Likely

Very

Likely

https://ls.qualtrics.com/ControlPanel/R.js?action=GetSurveyPrintPreview&st=5K4AsQyh4CEp8h3GmKn3k
Walk to a family member's room to talk to them instead of sending an electronic message:

Stand up while talking on the phone:

Stand up during meetings:

Stand up while doing chores:

Use a bathroom on another floor:

Stand up or walk around after finishing a part of a book:

Stand up or walk around after finishing a part of a report:

https://s.qualtrics.com/ControlPanel/jax.php?action=GetSurveyPrintPreview&T=5K4SaQyHfECqpehGmKv0k
<table>
<thead>
<tr>
<th>Activity</th>
<th>Very Likely</th>
<th>Likely</th>
<th>Somewhat Likely</th>
<th>Somewhat Unlikely</th>
<th>Unlikely</th>
<th>Very Unlikely</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stand up or walk around after finishing a TV episode</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Stand up or walk around during commercial break</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Stand up or walk around after finishing a level of a video/computer game</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Setting a timer (e.g. on computer or phone) to remind you to take a break from sitting</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Take a five minute break every hour</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

Section 10 - Post_PBC

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23/32
Section 10

Please indicate the extent to which you agree with the following statements about taking breaks from sitting at home and at work.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Somewhat Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Somewhat Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am confident that I can take breaks from sitting <strong>at home</strong>.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I am confident that I can take breaks from sitting <strong>at work</strong>.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Post_Social Norms (Home)

Please indicate the extent to which you agree with the following statements about breaks from sitting AT HOME.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Somewhat Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Somewhat Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most people who are important to me would approve of me taking breaks from sitting <strong>at home</strong>.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Most people like me would take breaks from sitting <strong>at home</strong>.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Post_Social Norms (Work)

Please indicate the extent to which you agree with the following statements about breaks from sitting AT WORK.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Somewhat Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Somewhat Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most people who are important to me at work would approve of me taking breaks from sitting <strong>at work</strong>.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Most people like me would take breaks from sitting <strong>at work</strong>.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Attention Checks

Section 11

The following questions will ask you about the message you previously read.

What was the message about?


161
Whose logo appeared on the message?

A graphic appeared on the left side of the message - what was in that graphic?

Please indicate your **immediate response** to the following items.

Please rank the message you just read using the following word pairs.

<table>
<thead>
<tr>
<th>Unbelievable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>Believable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uncredible</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>Credible</td>
</tr>
<tr>
<td>Uninformative</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>Informative</td>
</tr>
</tbody>
</table>

**Felt Emotions**

Please indicate how much emotion you felt while reading the message.

None  | A little  | Some  | Quite a bit | A lot

**Consider Feelings**

Please indicate the extent to which you agree with the following statement: *"Reading the message made me consider the feelings and emotions that are associated with taking breaks from sitting."*

| Strongly Disagree | Disagree | Neither Agree nor Disagree | Agree | Strongly Agree |

**Rational Reasons**

Please indicate the extent to which you agree with the following statement: *"Reading the message made me think about the rational reasons to take a break from sitting."*

| Strongly Disagree | Disagree | Neither Agree nor Disagree | Agree | Strongly Agree |
Reliance on Emotions

Please indicate the extent to which you relied on emotion to evaluate this message.

<table>
<thead>
<tr>
<th>Not at all</th>
<th>A little</th>
<th>Some</th>
<th>Quite a bit</th>
<th>A lot</th>
</tr>
</thead>
</table>

Highlights Emotions

Please indicate the extent to which you agree with the following statement: "This message highlights the positive feelings and emotions one would experience by taking breaks from sitting."

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Somewhat Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Somewhat Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

Reliance Rationality

Please indicate the extent to which you relied on rationality to evaluate this message.

<table>
<thead>
<tr>
<th>Not at all</th>
<th>A little</th>
<th>Some</th>
<th>Quite a bit</th>
<th>A lot</th>
</tr>
</thead>
</table>

Thoughts_Beneficial

Please indicate the extent to which you agree with the following statement: "This message stimulated my thoughts about why it would be beneficial to take breaks from sitting."

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Somewhat Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Somewhat Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

NFA/NFC

Section 12

Please indicate the extent to which you agree with the following statements.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Somewhat Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Somewhat Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

I usually end up thinking a lot about issues even when they do NOT affect me personally.
Neither Agree nor Disagree
Quite a bit
A lot

I make decisions with my heart.
Neither Agree nor Disagree
Quite a bit
A lot

I like being around sensitive people.
Neither Agree nor Disagree
Quite a bit
A lot

It’s enough for me that something gets the job done; I don’t care how
Neither Agree nor Disagree
Quite a bit
A lot

https://ls.qualtrics.com/ControlPanel/ajax.php?action=GetSurveyPrintPreview&surveyId=5K4SaQyh#OEqphGmK0k

26/32
or why it works. I would rather do something that requires little thought than something that is sure to challenge my thinking abilities. I do NOT like to have the responsibility of handling a situation that requires a lot of thinking. I am a feeling person. My feelings reflect who I am. I feel relief rather than satisfaction after completing a task that required a lot of mental effort. When I recall a situation, I usually remember its emotional aspects. Feelings come naturally to me. I would prefer a task that is intellectual, difficult, and important to one that is somewhat important but does not require much thought. I appreciate opportunities to discover my true feelings. I try to anticipate and avoid situations where it is likely I'll have to think in depth about something. I often get too emotionally involved.

Demographics

Section 13

What is your exact age?

What is your gender?

Male
Female
Other

Which state/province do you live in?

What is your race?
What is the highest level of education you have completed?

No schooling
Elementary (Grades 1-8)
High school (Grades 9-12)
Community/Technical College
University (e.g. Undergraduate, Teacher's College)
Master's/Professional Degree
Doctorate Degree
Post-Doctorate Degree

What is your employment status?

One full-time job
One part-time job
Two or more full-time jobs
Two or more part-time jobs

In which industry are you currently employed?

What was your total household income over the past 12 months (before taxes)?

Less than $25,000
$25,000 to $34,999
$35,000 to $49,999
$50,000 to $74,999
$75,000 to $99,999
$100,000 to $149,999
$150,000 to $199,999
$150,000 to $199,999
$200,000 or more

https://its.qualtrics.com/ControlPanelAjax.php?action=GetSurveyPreview&T=5K4SaQhytNCEojhGmK0k
Debriefing

Debriefing Letter

Take a Break. Take a Stand! Increasing attitudes and intentions to take breaks from sitting through the use of affective versus cognitive messages.

Thank you very much for taking the time to participate in this study! 😊

What are we hoping to learn from this study? The main purpose of this study was to test and compare the influence of various types of advertisements (emotional and rational) on adults' attitudes and intentions to take breaks from sitting at home and at work. You were shown either an emotional advertisement (“Stand Up and Feel Happy and Healthy”), a rational advertisement (“Stand Up and Improve Your Health Status”), or no advertisement. We also wanted to know how other factors, such as how much you sit, how much you exercise, your level of control over taking breaks from sitting, and social standards towards breaks from sitting, influence your attitudes and intentions to take breaks from sitting.

Additionally, the length of time you spent on the advertisement section of the study (phase 2) was recorded, as this may help us to understand differences in attitude and intention change. However, length of time spent answering questionnaires one (phase 1) and two (phase 3) were not recorded. Lastly, the logo displayed at the bottom of the emotional and rational advertisements is a fictional organization logo and was created for the purposes of the study. The logo makes the advertisement look more realistic, credible, and representative of real-world health promotion advertisements. It is well established that advertisements that appear credible are more influential than advertisement that appear less so.

What can we do with what we learn? Understanding the types of advertisements that motivate adults to make healthy choices will help researchers and public health experts to create meaningful advertisements. With more information surfacing indicating that sitting for long periods of time has severe mental and physical health effects on adults, it has become even more important to find ways of spreading knowledge and motivating adults to reduce periods of prolonged sitting.

We are happy to provide you with a summary of the findings from this study. If you would like a summary, please contact Hoda Gharb at big18@queensu.ca.

You can download a copy of the Debriefing Letter by clicking on the secure download link below:

Debriefing Letter

https://qualtrics.com/ControlPanelApp.php?context=GetSurveyPreview&studyId=6751e58f74fcd6f8457ec3423ce0008&autoPrint=1

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Appendix E
Ethics Approval

July 10, 2015

Miss Hoda Gharb
Master’s Student
School of Kinesiology and Health Studies
Queen’s University
28 Division Street
Kingston, ON, K7L 3N6

Dear Miss Gharb:

RE: Amendment for your study entitled: GPHE-195-15 Take a Break, Take a Stand! Increasing attitudes and intentions to take breaks from sitting through the use of affective versus cognitive messages; ROMEO# 6015876

Thank you for submitting your amendment requesting the following changes:

1) To change the control group from an active control, in which participants would see a message relaying tips to reduce sitting time, to a no treatment group, in which participants would not see a sitting- or break-related message;

2) To add attention check questions and additional manipulation check questions to the questionnaires;

3) Revised Pre-test Letter of Information (v. 2015/07/09);

4) Revised Pre-test Questionnaire (v. 2015/07/09);

5) Revised Study Questionnaire – Breaks from Sitting (v. 2015/07/09);

6) Revised Debriefing Letter (v. 2015/07/09).

By this letter you have ethics clearance for these changes.

Good luck with your research.

Sincerely,

John Freeman, Ph.D.
Professor and Acting Chair
General Research Ethics Board

c.: Dr. Lucie Levesque and Dr. Monica LaBarge, Supervisors