

EXPECTATIONS, SELF-PERCEPTIONS AND ATTRIBUTIONS FOR AGE

Investigating General Aging Expectations, Self-Perceptions for Aging and Attributions for  
Aging among Physically Active and Less Active Adults

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## Abstract

This thesis, comprising two studies, investigated whether negative expectations and self-perceptions relating to the aging process are associated with less physical activity (Study 1), and whether less active adults are likely to report age as a cause for physical activity failure than more active adults (Study 2). Using Sarkisian et al.'s (2002) Expectations Regarding Aging (ERA-38) survey, Study 1 first developed reliable and valid sub-factors for constructs relating to general aging expectations (GAE) and aging self-perceptions (ASP) by conducting exploratory factor analyses on 167 adults ( $M$  age = 59.5). Results revealed three acceptable GAE sub-factors relating to satisfaction/contentment, physical function and cognitive function, and three ASP sub-factors pertaining to functional, social, and sexual health. Subsequent MANOVA analyses showed that active adults reported higher GAE for satisfaction/contentment and cognitive function than less active adults. Regression analyses revealed that physical activity levels positively predicted satisfaction/contentment and physical function expectations among 45-54 yr olds. In Study 2, 177 adults ( $M$  age = 60.1) completed our Causal Dimension Scale for Aging (CDSA) and a survey asking whether age was a likely cause of failure in various physical activity contexts. Responses on the CDSA were used to validate 'General Attributions towards Age' (GATA), a measure which captured how adults view the aging effects. Subsequent analyses of variance determined that GATA interacted with physical activity status (active, less active) to influence the reported likelihood of age as a cause for failure. Less active adults with stable/uncontrollable GATA reported greater likelihood of age as a cause for failure than all other groups in gym, recreational/community program, and unstructured/spontaneous activity settings. Separate age group analyses indicated that these trends were pronounced in an unstructured/spontaneous activity setting for 45-54 yr olds, and in a generally recently inactive scenario for 55-64 yrs.

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This research project could have not been done without the help and guidance of my supervisor, Dr. Bradley Young. My graduate experience has been positive and most memorable thanks to my supervisor's encouragement and utmost support. Thank you! I would also like to thank my committee members, Dr. Natalie Durand-Bush and Dr. Shaelyn Strachan, for their expert knowledge and feedback to help make this project a success. Last, I would like to thank the community organizations participating in this project. Their role in this project was essential and greatly appreciated.

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## Introduction

Age is considered a primary risk factor for the development of degenerative diseases (Ostchega, Harrier, Hirsch, Parsons & Kingston, 2000; Paterson, 2002). Alongside the aging process, the relative risk of developing and dying from chronic diseases such as cardiovascular disease, type 2 diabetes, obesity and certain cancers increases (Singh, 2004). Studies focusing on the effects of physical activity on physiological functioning and body composition with advancing age have demonstrated statistically significant decreases in the relative risk of cardiovascular and all-cause mortality among persons who are classified as highly fit/active compared with those in a similar age range who are classified as moderately fit/active and low fit/active (Chodzko-Zajko, Protor, Singh, et al. 2009). Warburton, Nicol and Bredin (2006) reported evidence demonstrating that “regular physical activity contributes to the primary and secondary prevention of several chronic diseases and is associated with a reduced risk of premature death” (p. 807). Given this support, it is important to consider the preventative role of physical activity and the effect it has on the aging body in terms of delaying the onset of various diseases.

In general, physical activity has been associated with the successful aging of long-lived individuals. In studying specific cases of long-lived individuals, one characteristic associated with longevity is physical activity and exercise (Chodzko-Zajko et al., 2009). According to Chodzko-Zajko et al., regular physical activity seems to be the only lifestyle behaviour identified to date which can favourably influence a broad range of physiological systems and chronic disease risk factors and may also be associated with better mental health and social integration (McAuley et al., 2006).

With the growing number of older adults, a huge burden is placed on the Canadian health care system and the importance of maintaining good health and functional independence for this population is evident. According to Prohaska and colleagues (2006), the public health burden of

physical inactivity is demonstrated in terms of premature death, reduction in quality of life due to chronic diseases and conditions, and the economic medical cost of treating these chronic diseases. Given the current support that physical inactivity can lead to poor health and premature death in the older adult population, an important health objective of public health policy should be the promotion of physical activity and exercise.

The support for health benefits is apparent, yet, “less than forty-percent of adults aged sixty-five and older exercise routinely” (Sarkisian, Prohaska, Wong, Hirsch & Mangione, 2005, p. 911). As cited by Horton, Baker, Côté and Deakin (2009), “...while 98% of people over the age of 50 are aware that physical activity is important to maintaining their health” (p.1013), only 13% of senior women and 22% of senior men engage in enough physical activity to gain the positive benefits for health (Statistics Canada, 2005). Considering the future growth of Canada’s older populations, a greater focus towards increasing physical activity levels among this cohort is warranted. Specifically, it is important to investigate the reason for low participation levels to gain a better understanding of the barriers experienced by an aging cohort. Despite widespread research supporting the benefits of physical activity for the aging body, there has been little success with regards to motivating older adults to adopt and sustain an active lifestyle and an overall decline in physical activity levels has been observed (Chodzko-Zajko et al., 2009). With that said, the purpose of Study 1 was to investigate among a sample of active and less active younger, middle aged and older adults the effects of having: (a) different aging expectations and how these views relate to physical activity, and (b) different self-perceptions of aging and how these views relate to physical activity.

As defined by Sarkisian, Hays, Berry and Mangione (2002), aging expectations refer to the general outlook for achievement and maintenance of physical and mental functioning that occurs

with aging. For instance, believing that physical ability will decline as we age is a general expectation towards the process of aging that may serve as a barrier for participating in physical activity. Overall, the common hypothesis among studies dealing with age expectations has been that reporting stronger negative expectations of the aging process (i.e., believing that growing older encompasses general decline) is associated with engaging less with health behaviours (Sarkisian, Hays, Berry & Mangione, 2001; Sarkisian, Hays & Mangione, 2002; Sarkisian et al., 2005; Sarkisian, Shunkwiler, Arguilar & Moore, 2006). Research conducted by Sarkisian et al. (2002) and Goodwin, Black and Satish (1999) has shown an association between the belief that health problems are inevitable in old age and less use of preventative health services by older adults. Lacking within this body of literature is the relationship between aging-expectations and specifically, physical activity levels.

In terms of aging self-perceptions, this construct refers to a personal view of one's own aging and how individuals view themselves within the process (Levy, Slade & Kasl, 2002). Evidence suggests that perceptions of aging across a range of age groups are predominately negative (Nelson, 2005). It is proposed that the belief that aging is associated with a downward spiral and loss of physical and cognitive functioning may play a role on the health status of older adults. Recently, Levy and Myers (2004) have investigated to what extent "older individuals' beliefs about their own aging predict their likelihood of engaging in preventative health behaviours over time" (p. 625). Having negative self-perceptions of aging has been associated with poorer functional health and increased mortality (Levy, et al., 2002). With that said, although older adults' beliefs have been investigated in relation to health behaviours, there is little research with regards to the relationship between self-perceptions and the physical activity levels of adults.

When Sarkisian et al. (2005) looked at the relationship between negative aging expectations and physical activity, they commonly referred to the notion of “misattributions”. The term „misattributions’ suggested that older adults over attribute or misinterpret their overall decline in health to the aging process, which in turn, has been associated with less use of preventative health measures (Goodwin et al., 1999). In light of this, the purpose of Study 2 is to investigate the association between the frequency with which young, middle and older adult cohorts make aging attributions to explain physical activity occurrences and the physical activity levels among this population. Attributions are “perceived causes or reasons that people give for an occurrence related to themselves or others” (Biddle, 1993, p. 437). Research with attribution theory and older adults has focused mainly on the causal attribution of age with regards to a person’s success and failure on a certain task (Lachman & McArthur, 1986; Erber, Szuchman & Rothberg, 1990a; Erber, Szuchman & Rothberg, 1990b). Yet to be explored is the relationship between age attributions and health behaviours, specifically physical activity levels amongst aging cohorts.

The proposed investigation aimed to examine how the constructs of aging expectations and self-perceptions for aging (Study 1), and how concepts from Weiner’s (1985) attribution theory (Study 2), were associated with physical activity levels and age among adults in hopes to gain a better understanding of the age barriers to physical activity. In order to develop new strategies to increase physical activity participation among less active adults, we must first investigate the reasons for unsuccessful attempts to be physically active cited by adults and how these barriers relate to aging attributions specifically.

Expectations, self-perceptions and attributions for age will be examined separately in relation to physical activity level and age cohort. By examining both less active and active young, middle aged and older adults, it was our goal to infer if negative views of aging were associated with

lower activity levels. As well, there is limited research that uses a cross-sectional design to infer differences between aging cohorts on expectations, self-perceptions and attributions for aging and their physical activity levels. Therefore, we examined if differences exist between young, middle-aged and older adults for the psychological constructs mentioned. We hoped that this investigation would give us a better understanding as to where negative attitudes towards the aging process begin across an adult life span as well as when they may emerge and become more predominant. Finally, we investigated the interaction effect between activity level and age on the dependent variables, with separate analyses for these interactions relating to aging expectations and self-perceptions (Study 1), and analyses for age attributions (Study 2).

## Review of Literature

*Aging Expectations and Self-perceptions of Aging*

The following section begins by reviewing the importance of physical activity for the older adult population. Next, research pertaining to the expectations for aging and self-perceptions for age will be presented in terms of evidence linking these psychological variables to preventative health behaviours (including physical activity) and older adult well-being. This review will examine recent research reflecting the effect of harbouring negative views towards aging and associated disengagement from various preventative health behaviours. The review of literature will discuss previous research focusing on the aforementioned psychological variables as they relate to health seeking/preventative health behaviours broadly, as well, those few studies that suggest their relationship to physical activity level and age cohort.

*Importance of Physical Activity for Older Adults.* Reviews and meta-analyses on the consequences of sedentary behaviour in older adults have focused on a broad range of health outcomes “including domains of the disablement process such as pathology, impairment, functional limitations and disability” (Prohaska et al., 2006, p. 268). Given the importance of maintaining good health and functional independence later in life, it is important to consider the role physical activity has on the aging body.

Physical activity is a modifier to the risks that tend to emerge throughout the aging process. Prohaska et al. (2006) commented that there is consensus that regular physical activity reduces the risk of chronic conditions and that these benefits extend later into the adult life. Warburton et al. (2006) reported that the greatest improvements in health status are seen when the least physically active individuals become active. Thus, it is important to gather data to understand the mechanisms

behind why older adults are not active and how we can help to motivate non-active individuals to engage in physical activity.

*Pessimistic Trends for Physical Activity across the Lifespan.* Although the health benefits of physical activity have been widely cited, the results of a survey carried out by the Canadian Fitness and Lifestyle Research Institute (CFLRI) in 1997 reported that “only 34% of Canadians aged 25 to 55 years are meeting the recommendations in Canada’s Physical Activity Guide to Healthy Active Living” (Katzmarzky, Gledhill & Shephard, 2000, p. 1435). Regardless of the research supporting regular physical activity, the majority of the adult population continues to remain inactive. Recent cross-sectional data from the Aerobics Center Longitudinal Study suggest that “exercise-related energy expenditure is significantly lower in higher age groups than in younger groups” (DiPietro, 2001, p. 14).

The proportions of Canadians who are at least moderately active begins to decline among those in their 20’s (CFLRI, 2007). Moreover, when studies of populations track participation in physical activity levels cross-sectionally across the lifespan, there are consistently clear trends showing that there is an age-related decline in physical activity beginning in adolescence and continuing into and throughout adulthood. Longitudinal data tracking the life transition from adolescence into adulthood demonstrated that among all respondents who were active during adolescence, there was a substantial age-related decline in physical activity, while this decline in physical activity becomes even more pronounced after age 50 (King, Blair, Bild, et al., 1998).

To understand why people are, or are not physical active, efforts have been made to study possible influences for participation. Among these potential influences are “barriers”, which are real or perceived potential obstructions to the adoption, maintenance and continuation of physical activity (Booth, Bauman, & Owen, 2002). To increase physical activity levels among the aging

adults cohorts, a sound understanding of various barriers are needed in order to develop programs and policies that foster older adult participation. As there is a lack of research dealing specifically with how self-perceptions of aging and general aging expectations might act as barriers to physical activity, it is important to examine further if these variables play a deterring role away from regular physical activity.

*Perceptions of Aging and Aging Expectations as Barriers to Physical Activity.* For the aging population, many barriers, real or perceived, exist which act as obstacles to the adoption and maintenance of regular physical activity. One specific group of barriers to physical activity that has received recent attention in the literature relates to individuals' beliefs and attitudes towards the aging process. Lee, Arthur and Avis (2008) contended that the attitudes and beliefs of older adults towards the costs and benefits of physical activity later in life can influence their activity level. While the importance of an active lifestyle is well known, according to Shutzer and Graves (2004), "the elderly often believe themselves to be too old or frail for physical activity (p.1057). In fact, according to Williamson and Fried (1996) and Sarkisian et al. (2001), attributing health problems to "old age" rather than illness is a common phenomenon. These beliefs and attitudes towards aging have potentially negative influences on the likelihood of an older adult's initiation and maintenance of a regular physical activity regime.

Levy (2003) and Levy et al. (2002) have found evidence suggesting that negative aging perceptions increase among older adults, which in turn reduces involvement in healthy behaviours. Ironically, negative perceptions towards aging may reinforce the notion that aging brings forth weakness and that elderly individuals are too frail or too old to obtain health improvements, which in turn "promotes disengagement from behaviours such as exercise which is essential to maintaining functioning later in life" (Roters, Logen, Meisner, & Baker, 2009, p. 1). Given that

many of the barriers to engaging in physical activity among older people are perceptual/attitudinal, it is essential to take account of the psychological components because perceptual barriers, even if not genuine/actual, are sufficient to compromise physical activity. For the purpose of this study, we were therefore interested in the psychological constructs of aging expectations and self-perceptions towards the aging process which have the potential to act as barriers to physical activity participation among older adult populations.

*Aging Expectations*. Expectations, or future oriented cognitions, can be defined as "...an individual's probability driven assessment of the most likely outcomes" (Leung, Silvius, Pimlott, Dalziel & Drummond 2009, p. 348). These beliefs stem from past experiences and knowledge and in turn, have the potential to predict the likelihood of engaging in a particular event. Expectancies have been examined extensively using social-cognitive theory, which describes the learned associations between stimulus events, self-efficacy, and future outcomes (Maddux, 1999). We were interested in behaviour outcome levels (i.e., active or less active) associated with specific, probability-driven expectations (i.e., toward aging) that may have developed among middle-aged and older persons. In particular, we were interested in the specific pathway from expectancy to outcome. As attitudes and beliefs become more salient and expectations towards a certain event develop (i.e., aging), depending on the nature of these expectancies, these beliefs have the potential to facilitate or constrain behaviours or activity levels.

Aging expectations are similar to the concept of „expectations regarding aging’ which has been defined as “expecting achievement and maintenance of high levels of physical and mental functioning with aging, which indicates the expectations of achieved „healthy aging’ for *self* and *others*” (Kim, 2009, p. 85). The distinction between self and others’ perceptions towards aging is consistent with similar construct distinctions in psychological theories that examine how people

plan to do certain behaviours (e.g., Azjen, 1991). For instance, the concept of *attitudes* and *social norms* from the theory of planned behaviour (Azjen) closely relate to the concept of self-perceptions and general expectations of aging respectively. Within this theory, attitudes are defined as “the overall evaluations of the behaviour by the individuals” (Conner & Armitage, 1998, p. 1431), coinciding with the concept of self-perceptions. Social norms, on the other hand, are the “person’s beliefs about whether significant others think he or she should engage in the behaviour”; the “social pressures on individuals to perform or not perform a certain behaviour” (Conner & Armitage, p. 1431), which reflects conceptual similarities to the general expectations of aging. Theoretically, intentions to do certain activities are influenced by personal attitudes and social norms independently (Gretebeck et al. 2007). Intentions represent the amount of willingness and effort an individual plans to put forth when performing a behaviour. According to Gretebeck et al., the stronger the intention of an individual to perform a particular behaviour, the more likely the occurrence of that behaviour. Given the similarity to constructs of the theory of planned behaviour and the apparent independent influence these dimensions have on behaviour, it is therefore important to distinguish between self-perceptions and general aging expectations as each psychological variable has the potential to individually effect physical activity patterns.

According to Levy (2003), aging expectations are derived greatly from an individual’s social environment including dominant influences from the attitudes, beliefs and norms towards aging perpetuated by family, friends and health care providers. In certain cases, expectations towards aging reflect dominant social stereotypes. For example, Levy and Langer (1994) suggest that the popular stereotypes of aging in North America are predominately negative and exposure to these negative stereotypes have the potential to influence general expectations of the aging process, which in turn leads to compromised outcomes based on these beliefs. Horton et al. (2008) also

presented evidence suggesting that negative stereotypes of aging held by seniors can affect a variety of health behaviours.

Perhaps it is important to recognize that individuals who have positive attitudes towards aging (i.e., positive self-perceptions) might still have to function in a broader toxic social environment that discourages such beliefs (i.e., negative age expectations more generally for society). Kim (2009) argued that “without any expectations for healthy aging among older people themselves, encouraging them to participate in health promoting behaviour and thereby to maintain good health would be unsuccessful” (p. 85). With that said, it is important to investigate the effects of harbouring negative aging expectations as a barrier to physical activity in order to help younger, middle-aged and older adults change their expectations on aging in hopes to motivate them to become more physically active. A specific objective of this study is to determine whether having negative expectations towards the aging process in general is associated with lower physical activity levels among young, middle aged and older adult cohorts. Since generalized aging expectations are greatly a product of the broader social environment compared to an individual’s beliefs and attitudes towards the aging process, it is our goal to investigate generalized aging expectations compared to the self-perceptions for aging in relation to physical activity levels and age.

*Expectations Regarding Aging Survey and Health Seeking Behaviour.* Sarkisian et al. (2002) developed a reliable and valid instrument to measure whether or not, and for which circumstances, older adults have low expectations towards aging. The Expectations Regarding Aging (ERA-38) survey has been used to examine the association between aging expectations, health behaviours, health service use and subsequent health (Sarkisian et al.). Although this questionnaire will be

reviewed in greater detail within the methods section of this proposal, it is important to note the nature of the questions on this survey as it pertains to our study.

In the first part of the ERA-38, items refer to one's own beliefs, or self-perceptions, towards one's own aging process. For instance, one question states "When I get older I expect I will be able to do everything I want to". On the other hand, the second part of the survey focuses on items that refer to expectations towards older people in general, or generalized expectations. An example of a question in the section asks "When people grow older, one thing or another is going to go wrong with their body". Use of the ERA-38 in the past has measured expectations towards the aging process in its whole entirety, collapsing self-perception items with generalized expectation items. There have been no attempts to use this instrument to distinguish the differences between an individual's self-perceptions for age (their own attitudes and beliefs) and one's general expectations of older people and the aging process. With that said, this study aimed to determine if differences do in fact exist between self-perceptions and aging expectations as they each relate to the physically active and inactive adult cohorts as well as different age cohorts.

Recently, studies have emerged that specifically focus on the concept of "aging expectations" among the elderly and how their cognitions relate to their health seeking behaviours. Sarkisian et al. (2002) investigated the association between expectations regarding aging and beliefs regarding healthcare seeking among older adults. Randomly selected community dwelling adults (n = 588) aged 65-100 were given the Expectations Regarding Aging Survey, a 13-item questionnaire examining the relationship between expectations regarding aging, health behaviours, health service use and subsequent health. Results showed that more than 50% of the participants felt that it was an expected part of aging to become depressed, to become more dependent, to have more aches and pains, to have less ability to have sex, and to have less energy. This study demonstrated that

reporting stronger negative aging expectations is associated with a) believing that aging is an inevitable process and b) believing that health promoting behaviours like seeking care from a physician is less of a priority as one becomes older.

Kim (2009) recently examined older people's expectations regarding aging on physical and mental health status and also the mediating effects of health promoting behaviour on the relationship between aging expectations and physical and mental health. A sample of 99 community residing older Koreans were given the short version of the ERA-38, Health Promoting Lifestyle Profile II, and Medical Outcomes Study 12-item short form. Results indicated that Korean older adults who expected to maintain good health as they age were more likely to experience better mental and physical health. In terms of the mediating effect through which aging expectations result in better health status, Kim found that the expectations about aging were partially mediated through the health promoting behaviour that influenced physical and mental health. Those older adults who expected to achieve and maintain higher physical and mental functioning were also more likely to participate in health promoting behaviours.

In another study investigating aging expectations among older adults ( $n = 611$ ) using the ERA-38, investigators found that those individuals who reported negative aging expectations also reported lower levels of health promoting behaviours (e.g., seeking medical care) (Sarkisian et al., 2006). Like the majority of studies using the ERA-38, this study did not associate aging expectations directly to physical activity levels. With that said, our proposed study plans to measure the physical activity level and then measure differences for groups high and low on this measure in terms of expectations regarding aging, in order to infer associations between actual physical activity behaviour and attitudes toward aging.

In sum, the common trends among ERA-38 studies dealing with age expectations has been that having low expectations for aging (i.e., reporting stronger negative expectations for age) is associated with reporting lower health behaviour levels (i.e., less use of preventative health services) (Sarkisian et al., 2002; 2005; 2006) and that having higher expectations of aging in later life (i.e., reporting stronger positive expectations for age) is associated with reporting engagement with health promoting behaviours (Kim, 2009). The causal mechanisms behind this relationship seems to be that reporting stronger negative expectations of the aging process affects health outcomes as individuals are less likely to engage in health behaviours. Older adults who view health problems, illness and general functional decline as an expected part of aging may be less willing to engage in health promoting behaviours (Sarkisian et al., 2002). Although these findings are important, few studies using the ERA-38 have specifically investigated the relationship between aging expectations and physical activity levels in older adults. With this in mind, further investigation of aging expectations is important in order to determine if reporting stronger negative expectations have an effect on health promoting behaviours and specifically on the health promoting behaviour of physical activity.

*Relationship between expectations regarding aging and physical activity.* There have been very few studies looking specifically at the relationship between aging expectations and physical activity levels among older adults. In one study by Sarkisian et al. (2005), a sample of 636 English and Spanish speaking adults of 65 years and older was given self-administered written surveys which included the ERA-38 survey. The total score on the ERA-38 survey was used in which higher scores indicated expecting higher health related quality of life, and lower scores indicated expecting decline. Researchers specifically looked at the relationship between low age expectations and low physical activity for each of the 10 subscales of the ERA-38. They found that

expectations for general health, functional independence, pain and fatigue, and appearance were independently associated with low physical activity levels. Individuals who reported having lower expectations towards these five subscales of the ERA-38 also reported having lower levels of physical activity. To expand, for those who expected to have lower general health (e.g., body breaking down, physical deterioration), this was associated with lower levels of physical activity. For those older adults who expected to have lower functional independence (e.g., inability to complete daily activities), this was associated with lower levels of physical activity. Older adults who reported that they expected aging to be met with more pain and fatigue (e.g., aches, decreased energy) also reported lower levels of physical activity. Lastly, for those who expected their appearance (e.g., attractiveness) to decline as they age reported lower levels of physical activity.

Although Sarkisian et al.'s (2005) findings supported their hypothesis that harbouring low-age-expectations may act as a barrier to physical activity among sedentary older adults, there were certain limitations in their study. Firstly, they made no attempt to separately analyze the differential effects between self-perceptions for age and generalized age expectations, instead they used a total score on the ERA-38 by combining both age expectations and self perceptions for age. This present investigation separated the two variables to infer their isolated effects on levels of physical activity. This is important considering that each variable may have a different relationship to the physical activity levels of older individuals.

Secondly, like other studies using the ERA-38, Sarkisian et al. (2005) used an age cohort of 65 years and older. Although this age bracket fits into the definition of „older adult’, according to King et al. (1992), physical activity has been found to decrease with age and much earlier in the lifespan. Because physical activity levels are reported to decline earlier in adulthood than 65, it is important to explore the relationship between aging expectations and physical activity levels in

younger cohorts. In the present investigation, participants were divided into younger, middle and older age groups. A cross-sectional approach was used to compare across groups to test the differences that may exist between different age cohorts on aging expectations. It is important to include a cross-sectional approach to divulge where along the lifespan beliefs and attitudes pertaining to age become more salient. Furthermore, by expanding the age bracket to middle-aged years and cross-sectionally comparing across the different age cohorts, it is possible that we can pinpoint if negative age expectations form earlier in middle-age or if they are already omnipresent present at younger ages. This information could be useful to health policy makers as they will be able to target new strategies to specific age groups.

*Self-Perceptions for Aging.* Self-perceptions refer to an individual's awareness of the characteristics that constitute one's self (Markus, 1977). The formation of cognitive structures about the self stem from our "attempts to organize, summarize or explain one's own behaviour in a particular domain" (Markus, p. 63). This study is interested in the cognitive structures that have developed around an individual's personal attitudes and beliefs towards their *own* aging and how they view themselves within this process. According to Mead (1934), internalized attitudes and beliefs have the potential to become part of the individual's self. The argument then is, if negative perceptions of aging become part of the self, predictions towards how one will experience growing older will ensue, potentially influencing behaviours as these negative beliefs become a reality. Merton (1957) describes this mechanism as a self-fulfilling prophecy, that is, "in the beginning a false definition of a situation evokes a new behaviour which makes the originally false conception true" (p. 423).

In general, research on self-perceptions across a range of age groups has found that there tends to be a predominately negative view of the aging process (Nelson, 2005). Furthermore,

recent evidence has suggested that negative perceptions among the aging population reduce involvement in healthy behaviours (Levy, 2003; Levy et al., 2002; Levy, Hausdorff, Hencka & Wei, 2000). With that said it is important to investigate the effect of having negative self-perception of aging as a barrier to health behaviours, specifically physical activity, in order to promote positive self-perceptions as these views can have important effects on health-seeking behaviour and well-being across the lifespan (Roters et al., 2009).

To date, there is little research specifically looking at aging self-perceptions and their role in predicting physical activity levels among older adults. Before reviewing the few studies that do pertain to physical activity, therefore, it is important to review studies on aging self-perceptions more broadly as they relate to health and health-seeking behaviours to orient the reader to this issue.

*Relationship between aging self-perceptions and health.* Within the literature on older adult populations, studies have examined whether or not negative aging self-perceptions have an impact on health behaviours and health outcomes. Levy et al. (2002) examined the role of positive and negative self-perceptions on functional health over time. Over an 18-year period, 433 participants from the Ohio Longitudinal Study of Aging and Retirement (OLSAR study) were followed beginning at 50 years of age to determine the role of their individual views of aging on functional health. Self-perceptions were measured using the five-item Attitude Toward Own Aging subscale from the Philadelphia Geriatric Center Morale Scale. The authors predicted that individuals who have more positive self-perceptions of aging would have better functional health over time compared to those individuals with negative self-perceptions for age after controlling for measurements of functional health at baseline, self-related health, age, gender, loneliness, race, and socioeconomic status. Furthermore, they hypothesized that perceived control of the situation

(aging) would mediate the relationship between self-perceptions and functional health over time. Results showed that older adults with positive self-perceptions for age reported better functional health and that effect of self-perceptions of aging increased with age, meaning that, as one grows older self-perceptions become more salient, increasing in importance with regards to health. This study also found that perceived control in terms of its effect on functional health was a partial mediator between self-perceptions and functional health over the aging process, meaning that if one felt more in control of their own aging, functional health would be better over time.

Although these findings are important as they demonstrate that harbouring negative self-perceptions for aging affect functional health over time, they failed to measure and examine outcome behaviours that stem from harbouring positive or negative perceptions of aging. Conversely, this study investigated whether negative self-perceptions for age have a specific association with lower behaviour outcomes for physical activity. Levy et al's. (2002) finding that the effect of self-perceptions increases as one ages was important in relation to the present study, especially because we examined similar relationships cross-sectionally to infer if self-perceptions towards aging change in accordance to life stage.

In another study, Levy et al. (2002) longitudinally examined the role of positive and negative self-perceptions and the outcome variable of longevity. They hypothesized that "older individuals' internalized age stereotypes contribute to the formation of aging self-perceptions, which, in turn can have physiological outcomes" (p. 261) that compromise longevity. Using a sample of 660 older adults 50 and older from the OLSAR study, results showed that older individuals with more positive self-perceptions of aging, which were measured up to 23 years earlier, lived longer than those with less positive self-perceptions of aging. Specifically, those with positive aging self-perceptions lived 7.5 years longer than those individuals who reported less positive aging self-

perceptions. As well, the results from the study demonstrated that the will to live partially mediated the relationship between self-perceptions of aging and survival (Levy et al., 2002). In this particular study, Levy et al. did not examine any behavioural factors that may explain why individuals who have positive self-perceptions for aging do in fact live longer than those older adults who have negative self-perceptions for aging. With that said, we examined physical activity levels, a direct outcome behaviour of harbouring positive and negative self-perceptions for age, which could help to explain long term levels of functional health and longevity.

*Relationship between aging self-perceptions and health promoting behaviours.* Levy and Myers (2004) focused on the effect of self-perceptions for aging on the likelihood of engaging in preventative health behaviours over time. According to Levy and Myers, “research has found that the older adult population is the least likely to engage in preventative health behaviours, even though these behaviours continue to benefit individuals throughout the lifespan (p. 635). A sample of 241 older adults over 50 years of age from OLSAR was surveyed to measure attitudes towards one’s own aging; participants were also asked on a survey how frequently they engaged or performed in various preventative health behaviours (eg., limited alcohol consumption, ate a balanced diet with restricted fat intake, participated in some types of exercise, followed the directions for taking prescription drugs, used a car seatbelt, limited use of tobacco, and had a complete physical examination at least every three years) in the past 20 years. It was found, after controlling for baseline measures, that individuals with more positive self-perceptions for aging engaged in more preventative health behaviours over the past 20 years (Levy & Myers).

This particular study is important considering it was the first attempt at investigating whether self-perceptions for aging has an effect on engagement patterns for preventative health behaviours over time. The finding that one’s cognitions towards the aging process as it relates to oneself has

an effect on the likelihood of engagement is important to consider in order to understand the barriers to successful aging faced by this cohort. Amongst Levy and Myer's (2004) repertoire of preventative health behaviour items presented to participants to report on was "participation in some types of exercise" over the past 20 years. Although exercise was included in their study, their question failed to define what was meant by "exercise", as well, participation in physical activity was not mentioned. It is important to note that the behavioural prediction related to the total score for all health promoting behaviours. No one behaviour, including exercise, was partitioned out in their analyses to infer if self-perceptions has any independent effects on particular preventative health behaviours. Given the evidence on the importance of maintaining physical activity throughout the lifespan, we isolated the variable of physical activity level to infer its direct relationship to self-perceptions of aging and to do so also as a function of age.

*Aging Expectations and Different Physical Activity Cohorts.* Recent research dealing with the attitudes and beliefs towards the aging process proposed that there would be differences between physically active and non-active individuals on these constructs (Roters et al., 2009). After surveying collegiate athletes versus non-athletic undergraduate students on their aging attitudes and knowledge of the aging process (including the ERA-38), results did not support their hypothesis. Our study was interested in their premise that differences may exist between active and inactive cohorts with regards to the attitudes and beliefs they hold based on their physical activity participation. It is important to note that this was a first attempt to investigate differences in cognition towards the aging process between active and inactive cohorts. This design was important as we investigated aging expectations and self-perceptions for aging between less active and active older adult cohorts. It is possible that no significant results were reported by Roters et al. between the groups as aging stereotypes and attitudes for one's own aging had not yet been

internalized or normalized at this age in college ( $M = 21.50$  yrs). With that said, there is value in investigating if self-perceptions and aging expectations differ between older active and less active individuals as older adults could become more cognizant of the aging process over the lifespan.

### *Summary*

In this chapter, the evidence linking older adults' aging expectations and self-perceptions for aging, health promoting behaviours and physical activity was reviewed. Consistent evidence has shown a relation between reporting stronger negative expectations or harbouring lower aging expectations and negative aging self-perceptions and less engagement in preventative health behaviours. Although the current literature successfully demonstrates the effect of attitudes and beliefs on a host of health preventative behaviours among older adults, limited research has specifically isolated physical activity as a health promoting behaviour and its relationship to such views. Secondly, the majority of studies dealing with aging expectations and self-perceptions for aging set their sample lower age limits for age cohorts at 50 years, or 60 years and above; there is a need to examine a broader expanse of ages cross-sectionally to capture transitions from young to middle age and middle age to older ages (i.e., retirement, death of family and friends, health problems associated to aging). Thirdly, as far as we know, there are few studies specifically comparing physically active and inactive younger, middle-aged and older adult cohorts within the aging expectations and aging self-perceptions literature. Fourthly, research using the ERA-38 has not yet attempted to distinguish between general aging expectations and self-perceptions for aging and their independent effect on physical activity levels. To expand on this point, the majority of studies using the ERA-38 have used the results from this survey to infer associations between self-perceptions and aging expectations to preventative health behaviours. There have been few studies that measure self-perceptions and aging expectations to *actual* preventative health behaviour like

physical activity. As such, a case for further investigation into the role of aging expectations and self-perceptions for aging on physical activity levels in different active and inactive adult cohorts, and as a function of age, was made.

## Review of Literature

*Aging Attributions for Compromised Physical Activity*

When Sarkisian et al. (2005) investigated the relationship between negative aging expectations and physical activity they commonly referred to the notion of „misattributions’ or „overattributions’ to the aging process. The misattribution of problems to old age, otherwise known in the literature as *age attributions*, is a term that demonstrates the tendency of individuals to blame problems on the aging process, rather than on other extenuating circumstances (Levy, Ashman, & Slade, 2009). According to Kart (1981), “overattribution of symptoms to the aging process directs the attention of the elderly person away from real disease and/or environmental factors that may affect health” (p.78). Older adults’ „misattributions’ or „overattributions’ for their decline in health to symptoms of the aging process has been associated with less use of preventative health measures (Goodwin et al., 1999). In light of this, it is important to investigate relationships involving aging attributions among middle-aged and older adults to better understand why certain aging cohorts are less physically active, and whether less active cohorts overly attribute to age as a reason for their failure to be active. If this is the case, then misattributions to age might indeed be deterring certain aging cohorts from engaging in physical activity.

To begin, an overview of attribution theory (Weiner, 1985) will be provided as a theoretical framework for the present investigation to help better understand the reasons that older population give for failed instances of physical activity. Next, previous research focusing on age attributions as they relate to health seeking/preventative health behaviours broadly will be reviewed, along with those few studies that suggest their relationship to physical activity level and age cohort. Finally, this review will examine research dealing with how adults make attributions for other older adults’ failures versus the self-attributions that older adults make for their own failures.

*Attribution theory and its relation to failure.* Wiener's (1985) attribution theory is based on the premise that individuals explain their successes and failures using causal attributions, defined as the "perceived causes or reasons that people give for occurrences related to themselves or others" (Biddle, 1993, p. 473). Weiner defined attributions as peoples' perceptions that may be classified within three dimensions. First is *locus of causality*, which Weiner refers to as whether causality is defined as referring to causes either about the attributor, an internal attribution, or causes outside the attributor, an external attribution. Examples of the internal and external attributions related to the individual include "ability" and "weather", respectively. Second is *stability*, which Weiner defined as either causes that are constant over time, i.e., stable attributions, or causes that are variable over time, referred to as unstable attributions. For example, "age" would be defined as a stable cause whereas "social constraints" would be defined as unstable attributions. The last dimension used to classify attributions is *controllability*, which referred to causes that could be changed or affected by the attributor or other people (i.e., controllable attributions) or those causes that cannot be changed or affected (i.e., uncontrollable attributions). For instance, "effort" is classified as a controllable attribution and "luck" is defined as an uncontrollable attribution.

The three dimensions described above have been found to be important in understanding an individual's affective responses to an event and an individual's changes in their expectations for future success and failures. It is proposed that a future behaviour is mediated by the perceptions of causality, which in turn influence the affective responses to an event's success or failure, expectancy of future success or failure and subsequent performance (Covington & Omelich, 1979).

In terms of the physical activity domain, attribution theory is relevant for understanding future behaviour and behavioural intentions by focusing on the psychological processes that an

individual uses to explain why a particular outcome occurred (e.g., Why did I not attend my exercise class last week?) (Courneya & McAuley, 1996; McAuley, 1992). The three dimensions described above have been found to be important in understanding an individual's affective response to an event and an individual's changes in their expectations for future success and failures. It is proposed that future behaviour is mediated by the perceptions of causality, which in turn influence the affective responses to an event's success or failure, expectancy of future success or failure and subsequent performance (Covington & Omelich, 1979). According to Courneya and McAuley, a person's identification of causality along the three dimensions (e.g., internal/external, stable/unstable, controllable/uncontrollable) following event outcomes in the exercise domain is significant when the outcome is negative. For instance, failing to be physically active or engage in regular exercise may affect future expectancies to be successful within this domain and it is predicted that this is especially the case when failures are attributed to internal, stable and uncontrollable attributions. In turn, such attributions are hypothesized by Weiner (1986) to influence intention and future behaviour. Empirical evidence has demonstrated the important role that intention holds as an immediate determinant of volitional (e.g., the will) human behaviour (Ajzen, 1991). The use of intention within the model of attribution theory has been supported by both theoretical and empirical findings (Weiner). In general, individuals who have reacted to failure with internal, stable and uncontrollable attributions have negative affective responses (e.g., shame, guilt), lower intentions to do the same behaviour again, and are less likely to engage in the same behaviour in future (Covington & Omelich).

Within the research pertaining to older populations, the attribution of age is typically conceived as internal, stable and uncontrollable (Sarkisian et al., 2005; Sarkisian et al., 2007). According to this theory (Weiner, 1985), following failure, attributions that are internal, stable and

uncontrollable (like age) are especially detrimental to motivation (Sarkisian et al. 2007) and future intentions for behaviour (Courneya & McAuley, 1996). Thus, this study was interested in the physical activity levels of young, middle aged and older adults and the type of causal attributions they make regarding their failures to be physically active. As well, we were interested in whether certain cohorts more frequently make the causal attribution to age (i.e., older aged cohorts who are currently physically inactive) as an internal, stable and uncontrollable process cited as a reason for physical inactivity.

Among the attribution research with older populations, there is very limited research that explores the relationship between making attributions to age and the physical activity levels among older adult cohorts. Although no experimental studies have examined this relationship, one intervention study by Sarkisian et al. (2007) demonstrates that attribution retraining has the potential to raise the physical activity levels of older adults. In their study, a sample of 46 sedentary adults 65 years and older attended four weekly 1-hour group sessions conducted by a trained health educator who applied a “theoretically grounded, standardized „attribution retraining’ curriculum developed by a multidisciplinary team of investigators” (Sarkisian et al., 2007, p.1842). The attribution retraining program aimed to teach participants that becoming sedentary is not inevitable as one ages and those older individuals should attribute being sedentary to modifiable attributions (e.g., controllable causes) rather than old age (Sarkisian et al., 2007). Results from this pilot test supported use of a structured attribution retraining program alongside weekly exercise classes. Together, both were associated with increased walking levels and improved quality of life in sedentary older adults (Sarkisian et al., 2007). Although this study did not explore the actual attributions made by the participants and their relation to behaviour, attribution retraining showed the potential to change behaviour by raising physical activity levels. Based on the results from this

study, aging attributions among older adults deserves further experimental investigation with regards to their potential association with the physical activity levels of older adults. Outside of this study, there is no research thus far that we know of examining the failure to be physically active and the causal attributions that older adults give for such events. In light of this limited research, this section will instead review the relationship between age attributions and functional health among older populations.

*Age attributions, functional health, and difficulties performing functional tasks.* Recent attribution studies focusing on older populations have focused on the effect of age attributions on common daily tasks important to functional health. Williamson and Fried (1996) aimed to determine the frequency with which older adults attribute their difficulty performing a number of common daily tasks to “old age”. The evaluation included physical performance evaluations, which included both performance based and self-reported function for 27 different physical tasks. Those participants who could not perform the specified physical task or had the task modified were asked to name the cause of their difficulty. Among options that were presented, “old age” was offered as a reason participants could report to explain their failures to complete the original task. Of the 230 participants, 20 % cited “old age” as the cause of their disability in two or more tasks. Tasks for which difficulty was most frequently attributed to “old age” were dressing oneself, walking around the house, walking half a mile, cutting toenails, getting in or out of bed/chair/car and ascending/descending stairs. Although this study did not specifically examine the frequency of reported “old age” to physical activity failures, it is important to note that within the 27 tasks mentioned, aspects of physical activity (e.g., walking around the house, walking half a mile) were included when subjects were asked to attribute failure or difficulty in completing physical tasks. Although no specific analysis was conducted to examine the relation between reporting “old age”

as a reason for failure and any of the physical activity measurements, it is important to note that tasks that did involve aspects of physical activity were among those tasks where older adults reported failure to old age. With the given results, further investigation into the association between the frequency of age attributions and physical activity behaviours among older adults is warranted.

Levy et al. (2009) examined older adults' tendency to make age attributions and associated effects on aging health. It was hypothesized that older adults would have a greater tendency to make age attributions for failures within the cognitive (e.g., memory) and physical domain (e.g., perceiving bodily pain). As well, it was predicted that a greater propensity for forming age attributions within the cognitive and physical domain would be associated with worse functional health as measured by the Health Scale for the Aged. The Health Scale for the Aged was adapted from Rosow and Breslau's (1966) Guttman scale which measures functional capacity of older individuals. The Health Scale for the Aged uses interview questions to produce six response categories (Rosow & Breslau). In the case of this study, these categories refer to six physical activities that each respondent is able to perform. The responses are subjective and yield a functional health score (6 = best, 0-1 = worst). A sample of 227 Americans ( $M$  age = 74 yrs) and 327 Japanese participants ( $M$  age = 69 yrs), consisting of both younger participants (aged from 18 to 33) and older participants (60 and over), were presented with two vignettes to measure their *own* age attributions in the cognition and physical domain. The vignettes specifically depicted failures in the cognitive and physical domain (e.g., misplacing keys, waking up with an ache in your leg). After presenting the vignettes, investigators asked participants to consider their own attributions by instructing them to report if their failure was due to age (e.g., I seem to be getting old) or an extenuating circumstance (e.g., I slept in an uncomfortable position). Among their findings, older

adults in both countries were more likely to make more age attributions for both vignettes than younger individuals. As well, a higher age attribution score was significantly associated with a lower functional health measurement from the Health Scale for the Aged (Levy et al., 2009). These results are important as they demonstrate that among older individuals, age is a factor when making causal attributions towards the failed instances of physical activity presented and these aging attributions are associated with the functional health of older adults. Further investigation is needed to determine if age attributions are associated with certain behaviour outcomes (e.g., physical activity). Also, a cross-sectional approach is warranted to examine among older adult cohorts where along the lifespan age attributions become more salient in their associations to physical inactivity.

*Observer attributions vs. self-attribution* . Some research has focused on the age differences in attributions between younger and older individuals. Most of these studies have used an *observer paradigm*, “in which subjects make attributions for the performance of another person rather than for their own performance” (Lachman & McArthur, 1986). Although a self-attribution paradigm rather than a veritable observer paradigm will be employed in the current study, a brief review of studies using the observer paradigm is important due to a dearth of studies using a self-attribution paradigm among older adults, and also for methodological and analytical reasons that inform the present research. In particular, several observer paradigm studies (Erber, Prager, Williams, & Caiola, 1996; Erber et al., 1990a; 1990b) have focused on the causal attribution given by younger and older individuals with regards to their perceptions of others’ memory failures on certain tasks. For example, Erber et al. (1990a) investigated the differences in attributions that people of different age groups gave for others’ (i.e., targets’) memory failure and whether attributions varied based on the age of the target person. A sample of 86 young ( $M$  age = 24.1 yrs) and 84 older ( $M$

age = 71.1 yrs) subjects were presented with eight different vignettes that reflected the every day memory failures of younger and older targets. A 7-point Likert scale was presented asking participants to judge possible reasons for the targets' memory failure which included attributions to poor ability, lack of effort, difficulty of the task, bad luck, external factors and internal factors (1 = not at all the case; 7 = very much the case). Results showed that for young versus old targets, older targets were perceived as having greater mental difficulty (i.e., an internal, stable and uncontrollable attribution) than were young targets for identical memory failures (Erber et al., 1990a). As well, significant differences were found for how observers of different ages made attributions. Judgments made by older observers for targets' memory failures were overall more lenient (i.e., older observers were less likely to attribute memory failure as an indication of mental difficulty and older subjects were less likely to recommend psychological/physiological examination for mental difficulty) compared to judgments made by the younger subjects (Erber et al., 1990a).

In a similar study, Erber et al. (1990b) investigated whether there were age, gender and individual differences in how young ( $M$  age = 22.1 yrs) and older adults ( $M$  age = 70.4 yrs) made attributions for targets' memory failures. Investigators used a methodology whereby observers were presented with 12 gender neutral vignettes depicting targets' short-term, long-term and very long-term memory failures, following which they were asked to rate possible attributions for such failure (including poor memory ability, lack of effort, difficulty remembering, bad luck and not paying attention) on a 7-pt Likert scale. Results showed that, irrespective of observers' age, observers attributed failures of young targets to lack of effort and lack of intention more than they did for failures of older targets. As well, results demonstrated that in terms of observers' age,

younger observers were more likely to attribute mental difficulty, an internal, stable trait, to memory failure when compared to older observers.

Across both studies by Erber and colleagues (1990a; 1990b), findings demonstrated that young and old observers both attributed internal, stable and uncontrollable causes (e.g., memory failure, mental difficulty) to older targets whereas internal, unstable and controllable causes were attributed to younger targets (e.g., attention, lack of effort) (Erber et al., 1990a; 1990b). In terms of observer's age, both studies demonstrated that depending on the type of attribution being judged and the failure scenario being considered, differences between the attributions made by younger and older subjects are apparent. In both studies, investigators were interested in the attributions made by participants for others' (i.e., targets') memory failures, for both young and old groups of participants. Thus, it is difficult to generalize these findings to the goal of our proposed study which examined the self-attributions of older adults in relation to their own failures to be physically active. That said, the aforementioned studies had methodological aspects that are of merit. Both studies succeeded in presenting the internal, stable, uncontrollable attribution to age (i.e., mental difficulty) as a potential reason for failure among a host of attributions that could be used to explain others' failures. With that said, our proposed study was interested in isolating the attribution of age to infer how frequent this attribution was made in failures to be physically active among older adult cohorts. Moreover, do older adults who attribute failures to be physically active more to age (i.e., internal, stable, uncontrollable trait) report less physical activity compared to older adults who attribute physical activity failure more to external, unstable, controllable factors (e.g., time)? Furthermore, both studies chose to examine whether there were differences in how different age groups made attributions. Although these studies typically compared one young and old group, it is important to investigate multiple groups cross-sectionally (e.g., younger-adults,

middle-aged adults, older adults) to gain a better understanding of changes that may occur across the lifespan. In a study by Parr and Siegert (1993), a stepwise decrease in attribution ratings for lack of effort (e.g., unstable, controllable trait) and a stepwise increase in attribution ratings for lack of ability (e.g., stable, uncontrollable) was found as the target's age increased (i.e., 20, 40, 60) demonstrating changes in the type of attributions made across the lifespan. This was relevant because our study aimed to measure cross-sectionally the variable of age to determine where along the lifespan self-attributions towards age begin to change and become more salient in their association to physical inactivity.

Although it is important to consider observer attributions, attributions about others (observer attributions) differ from self-attributions (Watson, 1982). For the purposes of the present investigation, it was also important to consider how older adults perceive themselves. With that said, there has been limited research on self-rated attributions among older adult populations. One study in particular (Lachman & McArthur, 1986) investigated how younger ( $M$  age = 19.1 yrs) and older adults ( $M$  age = 74.9 yrs) made attributions about hypothetical situations and were asked to consider the reasons for successful or failed outcomes if they were in the scenario. A sample of 96 young and elderly adults were presented with 24 hypothetical situations reflecting successful or failed event outcomes in the cognitive domain (i.e., one's absentmindedness led one to purchase two subscriptions to a magazine), physical domain (i.e., one scoring higher than other players at shuffleboard because one is too weak to overshoot the mark) and the social domain (i.e., A relative does nice things for you because you needs help and companionship) (Duval & Wicklund, 1973). In this investigation, investigators invoked a self-attribution scenario by asking participants to image themselves experiencing the situation presented. As well, subjects were also asked to either make attributions for another person of the same age in the situation or another person of a

different age in the situation. For each event (success or failure), subjects rated three causes 1) internal stable (ability), 2) internal unstable (effort) and 3) external – on a 7-point Likert scale. As well, an additional force choice question was presented at the end asking each subject to identify which attribution they considered to be the best explanation or the most important for each hypothetical event. In terms of the self-rated results, the elderly participants were more likely to rate inability as a cause for poor memory (cognitive) and weakness (physical) than younger participants (Lachman & McArthur). The results of the forced-choice aspect of their study found that a greater percentage of elderly than the younger group chose ability as the cause for poor problem solving (cognitive) and failures in strength (physical) (Lachman & McArthur). These results are important as they demonstrate the tendency for older adults to make internal, stable and uncontrollable attributions to their own performance. In sum, these results showed that older adults made more internal attributions for their own failures compared to their successes demonstrating that older adults may have the tendency to make the types of attributions that would link to future expectancies for poor performance (Lachman & McArthur). Although this study yielded significant results between younger and older age groups for self-attributions, a middle-aged group was not included within their study sample. Our study aimed to isolate the attribution of age (i.e., stable, uncontrollable trait) to infer the effect of this attribution on the physical activity levels among multiple groups (i.e., young, middle and old) which might allow a more discriminate look at how types of attributions change across the lifespan. In terms of methodology, Lachman and McArthur used hypothetical situations to observe the self-attributions made by younger and older subjects with regards to their own performance. This aspect of their study was important as we isolated the attribution of age, among other causal attributions, through the use of hypothetical events presenting failures to be physically active. We aimed to explore the reported strength of a

specific attribution to age among less active and active older adult cohorts to gain a better understanding of the attributions made for physical activity failures.

### *Summary*

In this chapter, evidence linking older adults' aging attributions, health and physical activity was reviewed. Evidence has demonstrated that there is a relation between causal attributions for failure, aging and health. Although the current literature successfully links causal attributions to age with failure to perform cognitive (e.g., memory) and physical tasks (e.g., strength, walking half a mile) and functional health, limited research has specifically isolated physical activity failure as an event and its relationship to aging attributions. Secondly, the majority of studies dealing with aging attributions set their sample lower age limits for age cohorts at 50 or 60 years and above, or have used a younger comparison group when investigating age as a factor, failing to capture a broad range of adulthood. This demonstrates a need to examine a broader expanse of ages cross-sectionally to capture transitions in age attributions within young, middle and older age groups. Thirdly, there is no study specifically comparing physically active and inactive cohorts with respect to aging attributions. Thus, a case for further investigation into the role of aging attributions on physical activity levels in different active and inactive older adult cohorts, and as a function of age, is made.

### Overview of Studies

The purpose of this investigation was two-fold. Firstly, we examined aging expectations and aging self-perceptions as separate variables in relation to age and physical activity level in Study 1. Specifically, Study 1 aimed to determine if a relationship exists between aging expectations and physical activity levels among active and less active middle-aged and older adult cohorts. Study 1 also determined if a relationship exists between self-perceptions and active and less active cohorts and whether this changes as a function of younger, middle-aged and older adult cohorts. Secondly, Study 2 aimed to determine if active and less cohorts differ on their reported strength of making a specific attribution to age following failed attempts to be physically active, as well, whether this relationship varies as a function of age cohort.

Firstly, it was hypothesized that individuals with stronger negative aging expectations, stronger negative self-perceptions regarding aging and reported attributions to age following failure to be physically active would report lower physical activity levels. Specifically, less active older adults would report greater negative aging expectations, greater negative self-perceptions for aging and stronger attributions to age following failure than active older adults. Based on prior research involving comparisons between younger and older cohorts (Lachman & McArthur, 1986), we hypothesized that the oldest cohort would report higher negative aging expectations, higher negative self-perceptions for aging and make stronger specific attributions to age following failed attempts to be physical active compared to the youngest cohort.

Since physical activity has been found to reduce the risk of chronic conditions associated with aging (Prohaska et al., 2006), it is imperative to understand older adults' disengagement from preventative health behaviours like physical activity. Despite the evidence supporting physical activity as a health promoting behaviour, barriers to physical activity, real or perceived, must be

understood in order to develop new strategies to increase the physical activity levels among older adults. This study hoped to advance the extant literature by examining the influences of potential psychological barriers to physical activity, specifically negative attitudes and beliefs towards the aging process.

Additionally, past studies have demonstrated that negative aging expectations, negative self-perceptions for age and attributing failure to internal, stable and uncontrollable factors such as age have an effect on participation in preventative health behaviours, yet, there has been limited research investigating the effect of these psychological variables directly to physical activity levels among middle-aged and older adults. Hence, we aimed to examine whether aging expectations, self-perceptions for age and aging attributions have an effect on physical activity levels for these cohorts. Furthermore, no studies to our knowledge have investigated the relationship between age expectations, self-perceptions regarding age and aging attributions and physical activity considering both age and current physical activity level. Ultimately, we hoped that the expected association between aging expectations, self-perceptions for age and aging attributions can help us to understand the psychological barriers to physical activity. Pinpointing the potential influence of certain variables on the physical activity levels of adults is important as it can help in the development of new policy tactics and physical activity initiatives for the adult population. It was our aim to inform future physical activity interventions about the importance of having positive attitudes and beliefs toward aging in order to help motivate individuals to become more physically active.

## Review of Methodology

### *Participants*

The following section will review and summarize the recruitment of participants and the roles of participants within this investigation. Using convenience sampling, participants were selected from the Ottawa area as well as the Canadian Seniors' Games located in Brockville, Ontario. As this investigation wished to examine active and inactive younger, middle and older adults, we recruited participants from the Canadian Seniors' Games to potentially satisfy both active (e.g., track and field) and less active (e.g., bridge, volunteers surrounding the games) samples. As well, we recruited participants from the Ottawa area from a bingo hall, various community centres, mall walking group and canoe club to ensure that our active and less active samples are large enough. Participants were dichotomized into active and less active groups based on their scores from the Godin-Shephard Leisure Time Exercise Questionnaire which will be reviewed in the instrument section of this proposal. A minimum of 150 ( $n = 150$ ) participants were recruited to satisfy the goal of having 50 participants for each of the following age cohorts: 45-54, 55-64, and 65-74. Throughout the participant recruitment process, the number of active and less active participants for each group was reviewed to ensure that we were satisfying our goal total. As well, we collected from a spectrum of active (e.g., Seniors' Games) and less active (e.g., card playing group at a community centre) locations to obtain equal numbers in our groups.

To ensure the safety of all eligible participants, all participants were provided with an information letter outlining the purpose and details of the proposed study, a letter of informed consent, the responsibility of each participant and any potential risk associated with this study. After the information letter was fully read and understood, a letter of consent was signed by the participant

*Instruments*

In this study, participants were given a package containing four self-administered questionnaires: 1) Godin-Shephard Leisure Time Exercise Questionnaire (GLTEQ), 2) Expectations Regarding Aging-38 questionnaire (ERA-38), 3) Causal Dimension Scale for Aging (CDSA), and 4) Attributions for Physical Activity Questionnaire (APAQ). First, a self-administered 7-day physical activity recall was used to measure middle-aged and older adults' current physical activity levels (Godin & Shephard, 1985). Second, a close-ended questionnaire was administered to the participants to measure their expectations and self-perceptions towards the aging process (Sarkisian et al., 2005). The Causal Dimension Scale for Aging was used to measure how participants perceive aging as a cause of an event. Lastly, the Attributions for Physical Activity Questionnaire, developed by the researcher by borrowing items from similar methodology (Lachman & McArthur, 1986), was administered to measure participants' attributions towards their own failures to be physically active.

For the purpose of this study, data collected from the Godin-Shephard Leisure Time Exercise Questionnaire (Godin & Shephard, 1985) was used to determine and separate participants into active and less active cohorts (See Appendix C). This self-administered questionnaire measures current levels of physical activity by asking participants to reflect on the number of times during an average week one engages in exercise behaviours for more than 15 minutes which include mild (e.g. easy walking), moderate (e.g., fast walking), and strenuous (e.g., jogging) types of activities. A score can be calculated by weighting each frequency by its estimated intensity in metabolic equivalents (METs). A total score was obtained using the strenuous (frequency of strenuous bouts x 9) and moderate (frequency of moderate bouts x 5) values. The use of only the strenuous and moderate entities was based on scoring used by Godin and Shephard and reflects exercise associated with health benefits. A cut-point of 24 units was used to dichotomize between active and inactive

participants (e.g., 24<sup>></sup> is considered less active, 24<sup><</sup> is considered active enough to meet public health recommendations) (Godin & Shephard). In terms of reliability and validity for this questionnaire, reliable measures have been demonstrated with adults aged 20 to 59 (Jacobs, Ainsworth, Hartman & Leon, 1993) and validity with populations 18 to 65 (see Pereira, FitzGerald, Gregg, et al., 1997 for a review of all reliability and validity measures relating to this instrument).

To measure the variables of general aging expectations and aging self-perceptions, the ERA-38 (Sarkisian et al., 2002) was administered to participants (see Appendix C). Participants were first presented with 18 statements that are geared towards their personal attitudes and beliefs toward aging and then presented with 20 statements concerning expectations of older people in general. For each item, participants were to answer how they feel about the statement on a 4-point Likert scale ranging from definitely true to definitely false. Of the 38 items, there are 10 subscales which capture expectations and self-perceptions towards certain characteristics of the aging process. These include general health, cognitive function, mental health, functional independence, sexual function, pain, urinary incontinence, sleep, fatigue and appearance. The ERA-38 survey is a previously tested instrument on which higher scores indicate that participants expect and perceive high functioning with aging and lower scores indicate that the participant expects and perceives that aging will bring physical and mental decline (Sarkisian et al., 2002). The ERA-38 has demonstrated adequate internal consistency and reliability, as well as content and construct validity for older adults aged 65 years and above (Sarkisian et al., 2002).

The Causal Dimension Scale for Aging (CDSA) is a self-administered modified version of Russell's (1982) 9-item Causal Dimension Scale (CDS; also see Weiner, 1985) (See Appendix C). The CDSA was administered to capture and assess how the participant perceives along the three causal dimensions the effects of aging. According to Russell, "attributional statements are often

ambiguous and even when clearly stated may be perceived quite differently by the attributer and researcher” (p. 1137). The literature surrounding attribution dimensions cites age as an internal, stable and uncontrollable event (Sarkisian et al., 2002). With this in mind, the Causal Dimension Scale for Aging reflects the events of aging and was presented to participants to determine if the attributers do in fact perceive aging as an internal, stable and an uncontrollable attribution.

Participants were presented with nine phrases pertaining to aging as an event and were asked to make a personal judgment about the various reasons for the effects of aging. Following each of the prompts, participants were asked to make a personal judgment using a semantic differential scale representing each of the causal (attribution) dimensions. Like Russell’s CDS, three of the semantic differential scales are anchored at „internal-external’ (locus of causality), three are anchored with „stable-unstable’ (stability), and three anchored with „controllable-uncontrollable’ (controllability). For each of the nine prompts, participants were asked to evaluate the cause of the effects of aging by circling a number from one to nine, with “1” and “9” representing opposite ends on the respective scales.

Participants were presented with a questionnaire developed by the researcher (see Appendix C) called the Attributions for Physical Activity Questionnaire (APAQ). The methodology presented in the questionnaire was borrowed from Lachman and McArthur (1986) (see also Duval & Wicklund, 1973) and was adapted to be used among physically active and less active adults to measure various attributions in compromised physical activity scenarios. The questionnaire is a close-ended, self-administered survey which asked participants to imagine themselves in a scenario where physical activity had been compromised. The questionnaire contains attribution items that fit along the causal dimension scale (Weiner, 1985) (e.g., time, ability, effort, task difficulty) and reflect barriers to physical activity reported by older adults (Booth et al., 2002) (e.g., motivation, age, social

constraints). Attributions used within this questionnaire were specifically modeled after attribution theory's (Weiner, 1985) internal stable, internal unstable and external causal dimensions. The same seven attributions were consistently provided to respondents. "Age" and "ability" reflect internal stable attributions, "effort" and "motivation" reflect internal unstable attributions and "time", "task difficulty" and "social constraints" reflect attributions that are classified as external.

Participants were presented with nine different scenarios reflecting various physical activity events. Participants were asked to report on a 7-point Likert scale the reality of each scenario presented, ranging from very realistic to very unrealistic. These nine scenarios were a sampling of the spectrum of physical activity behaviours in which younger, middle-aged and older adults might engage including unstructured physical activity, exercise, fitness, active household chores, active transportation, daily Canadian physical activity guidelines and structured sport, leisure and recreational activities that reflect the many different facets of physical activity. Participants were instructed to imagine that each scenario described in the attribution questionnaire was happening to them, and they were asked to rate each cause for their own imagined failure. Using a 7-point Likert scale (1 = very unlikely cause, 7 = very likely cause), participants were asked to report on each of the seven listed attribution items below each scenario to explain how unlikely or likely they believe that item might be the cause for that particular event occurring.

The survey used the same series of 9 scenarios reflecting the failure to be physically active. Using a rank-order methodology, participants were asked to rank from 1 to 7 each of the same 7 attribution items to explain how important each item would be if they were experiencing that particular event. Lachman and McArthur (1986) used a similar methodology which demonstrated suitable reliability and validity by having a forced-choice measure asking participants to circle what they considered to be the most important explanation for their failed performance. This was to

determine if the internal and stable attribution for *ability* was the most frequent variable chosen for older adults' failure within cognitive, physical and social. Similar to Lachman and McArthur (1986), this study aimed to also use the rank-order methodology to determine if the internal stable attribution *age* was the most frequent variable chosen for middle-aged and older adults' failures to be physically active. As well, similar to Lachman and McArthur's (1986) forced choice section of their study, we developed a rank-order questionnaire in order to determine frequency counts (i.e., how frequently age is ranked among the top 3 choices).

In its entirety, the questionnaire items were developed to capture and combine a wide range of attributions for failure on certain tasks and barriers to physical activity that have been studied and identified as important in previous research (Booth et al., 2002; Weiner, 1985). To ensure the questionnaire was understood, multiple reviews took place. Reviewers included experts on the topic from the University of Ottawa, and a sample of adults who were able to comment on comprehension. Also, the questionnaires underwent a pilot test with a group of volunteers of appropriate ages, to ensure that each instrument was well understood by the participants. A series of exploratory factor analyses was used to confirm the factor structure of emergent dimensions for items on the CDSA, and internal consistency of these scales was also assessed using Cronbach alphas.

### *Procedures*

This study required the involvement of participants at the Canadian Seniors' Games in Brockville, as well as a local bingo hall, community centre, canoe club and walking group in the Ottawa area. We contacted these organizations to explain the purpose of our study to gain support and consent to engage with each of their respective populations. The remainder of this section will outline how we distributed our material as described in our instrumentation.

The researcher visited the Canadian Seniors' Games, the local bingo hall, community centre, canoe club and walking group in person. A 'Letter of Permission' (Appendix A) was given to an associate representative to gain permissions and consent to gather data from each organization. The researcher distributed questionnaires on-site from a designated table/booth at community organizations. Individuals who express interest in participating in our study were given a 'Letter of Information' (Appendix B) to gain consent. These participants were asked to complete and return this survey on-site. If interested persons prefer not to complete the survey on-site, participants were instead offered the option to take a survey to complete at home and return it using a pre-addressed and prepaid envelope, or to complete the survey on-line by providing an email address. If participants express interest in our study but wish to complete the survey online at their own leisure, they provided us with an email address for invitation to the online version of our study. For those individuals indicating interest in participation online, a subsequent letter of invitation via email was sent out by the researchers. In the invitation, participants were able to voluntarily link to a safe and secure online version of the survey, which could then be completed and submitted online.

### *Expected Analysis*

Using the Godin-Shephard Leisure Time Exercise Questionnaire, participants were classified as active or less active by using a cut-point of 24 metabolic equivalents (Godin & Shephard, 1985). For each participant, summing scores using the amount of strenuous and moderate bouts of exercise over a one week period of time was used (e.g., frequency of strenuous x 9 + frequency of moderate x 5). Scores lower than 24 were considered less active and scores of 24 and above were considered active. Activity status – active or less active – was included as an independent variable in the subsequent main data analyses. The other independent variable was participants' age by which participants were divided into three different age cohorts: 45-54, 55-64 and 65-74.

Data from all parts of the investigation were submitted to quantitative analyses. The ERA-38 generated 18 questions pertaining to aging self-perceptions and 20 questions pertaining to generalized aging expectations. Concurrent validity was assessed using Pearson product-moment correlation coefficients.

The dependent variables were the reported aging self-perceptions and general aging expectations. For the dependent variable for aging self-perceptions, a MANOVA was conducted to determine if significant differences exist for activity level and age cohort. Our between-group factor included activity level (active, less active) and our within-group factor was age (45-54; 55-64; 65-74). For the dependent variable for general aging expectations, a second MANOVA was conducted to determine if significant differences exist for general aging expectations for both activity level and age cohort.

The Causal Dimension Scale for Aging (CDSA) included nine phrases which asked participants to rate on a semantic differential scale various reasons for the effects of aging. Following each of the prompts, participants were asked to make a personal judgment using a semantic differential scale representing each of the causal (attribution) dimensions. Three of the semantic differential scales were anchored at „internal-external’ (locus of causality), three were anchored with „stable-unstable’ (stability), and three anchored with „controllable-uncontrollable’ (controllability). For each of the nine prompts, participants were asked to evaluate the cause of the effects of aging by circling a number from one to nine, with “1” and “9” representing opposite ends on the respective causal scales. A score for each of the three causal dimension scales (internal-external, stable-unstable and controllable-uncontrollable) were collapsed to reflect three raw scores. Relating to this data, various exploratory factor analyses were conducted to: a) assess if the three causal dimensions (locus of causality, stability, controllability) were inherent within the factor

structure: b) examine if the underlying factor structure was similar to that of Russell's albeit in a different attributional context: c) determine the unique underlying factor structure and associated measure for the CDSA and if the measure demonstrated adequate internal consistency reliability.

The Attributions for Physical Activity Questionnaire (APAQ) included nine scenarios which asked for seven responses totaling 63 given responses. The dependent variables were the reported strength scores for each attribution item (e.g., age, ability, effort, motivation, time, task difficulty and social constraints) and the independent variables were age and activity level. For the dependent variable attribution, three separate analyses were conducted. Using mean attribution scores from the APA Questionnaire, a 2 activity group (less active; active) x 3 age group (45-54; 55-64; 65-74) MANOVA was conducted for each of the seven attribution items. For the next two analyses, the dependent variable was how frequently participants reported the internal stable attribution of age among the top 3 attributions. Using rank-order scores from the APAQ, a 2 activity group (less active; active) x 7 (attribution item) chi-square analysis was conducted to determine whether active groups were more frequently reporting certain attributions as top-rated explanations than others, specifically the attribution of age. Third, a 3 age group (45-54; 55-64; 65-74) x 7 (attribution item) chi-square analysis was conducted to determine whether groups of different ages more frequently report certain attributions as top-rated explanations than others, specifically the attribution of age.

In sum, this study used four instruments. Information collected from the Godin-Shephard Leisure Time Exercise Questionnaire was used to dichotomize participants into active and less active groups. Self-perceptions for age and generalized aging expectations were reported via the ERA-38 and used to determine if low self-perceptions for age and low aging expectations differ significantly across age and activity level. Participants completed the Causal Dimension Scale for Aging to determine along the three causal dimensions (locus of causality, stability, controllability) how adults

attribute towards the effect of aging. Lastly, the Attributions for Physical Activity Questionnaire was used to determine the significant mean differences that exist between the strength of certain attributions, particularly the attribution of age, towards physical activity failure across age and activity level. As well, participants completed the rank-order section of the questionnaire to determine if significant differences exist between the frequency counts of top-ranked attribution items across age and activity level.

### *Design*

This study was a cross sectional design. A cross-sectional design is subject to a number of possible threats to validity and reliability. Content validity, which describes the ability of the instrument to measure what it is intended to, was minimized as all items have been grounded in the literature. As well, the newly developed questionnaire borrowed methodology from a valid study (Lachman & McArthur, 1986), as well, underwent a rigorous review process to ensure the questionnaire included reliable and face valid content. A panel of reviewers commented on the general comprehension and applicability of items in each instrument. Face validity for each attribution item included in the questionnaire was ensured through the review of literature. Furthermore, items from the ERA-38 were subjected to a series of exploratory factor analyses to confirm coherent and valid factor structures of themes derived from the self-perception items, and general aging expectations items, separately. In turn, valid themes were further subjected to Cronbach alpha tests to confirm internal consistency reliability. With respect to the CDSA, a series of exploratory factor analyses were conducted on items to: a) assess if the three causal dimensions (locus of causality, stability, controllability) are inherent within the factor structure: b) examine if the underlying factor structure is similar to that of Russell's albeit in a different attributional context: c) determine the unique underlying factor structure and associated measure for the CDSA and if the

measure demonstrates adequate internal consistency reliability. Finally, the Godin-Shephard physical activity questionnaire has already demonstrated reliability and validity in previous studies (Godin, Jobin, & Bouillon, 1986; Godin & Shephard, 1985), this instrument did not present any additional threats to the proposed study.

The possible threats to reliability are discussed in terms of internal and external threats. Internal threats include test-retest reliability, internal consistency and selection bias. Items found to be unreliable following our test of internal consistency were removed. Selection bias was also present, due to the non-random nature of the sample. Participants agreed to participate based on their expressed interest, so there was no way to determine if this population was representative of the general population and may have reflected self-selected motivational bias. Finally, strategies to control for external validity included the collection of demographic variables, such as sex, and age which we collected at the end of the last questionnaire (Appendix C). To respect external validity, results were interpreted and discussed with respect to the target population and care was taken to ensure results were not over-generalized.

Article 1: Investigating the General Aging Expectations and Aging Self-Perception  
of Physically Active and Less Active Adults

## Abstract

Using a sample of 167 adults (101 f, 66 m;  $M$  age = 59.5; range = 45-74), two separate exploratory factor analyses (EFA) were conducted using items from the Expectations Regarding Aging survey (ERA-38; Sarkisian et al., 2002) to develop reliable and valid sub-factors representing general aging expectations (GAE) and aging self-perceptions (ASP). EFA results showed three acceptable GAE sub-factors relating to satisfaction/contentment, physical function and cognitive function, and three sub-factors for ASP pertaining to function health, social health and sexual health. Next, we performed multivariate analyses of variance and various regression analyses to examine associations between physical activity level (active, less active), age (45-54, 55-64, 65-74 yrs), and scores for each of the GAE and ASP sub-factors. MANOVA results showed that active adults, irrespective of age, reported stronger negative aging expectations for satisfaction/contentment, and cognitive function. Regression analyses revealed that for the youngest cohort (45-54), satisfaction and contentment ( $\beta = .27, p < .05$ ) and physical function ( $\beta = .31, p < .05$ ) GAE sub-factors, after controlling for the variance attributed to age, were predicted by physical activity levels.

*Keywords:* physical activity, general aging expectations, aging self-perceptions

## Investigating the General Aging Expectations and Aging Self-Perception of Physically Active and Less Active Adults

Although participation in regular physical activity among adults is associated with many positive outcomes, an age-related decline in physical activity persists (e.g., CFLRI, 2010). Despite widespread research supporting the benefits of physical activity for the aged (Ostechegea, Harris, Hirsch, Parsons & Kingston, 2000; Warburton, Nicol & Bredin, 2006), there has been little success motivating older adults to adopt and sustain an active lifestyle. Considering future demographic trends in Canada, a greater focus towards increasing physical activity levels among this cohort is warranted. Specifically, it is important to investigate the reason for low participation levels to gain a better understanding of the barriers and motivators experienced by an aging cohort. In terms of attitudinal barriers, an important determinant that has received recent attention is the concept of „expectations regarding aging’, defined as “expecting achievement and maintenance of high levels of physical and mental functioning with aging, which indicates the expectations of achieved „healthy aging’ for *self* and *others*” (Kim, 2009, p. 85). This concept, which comprises general aging expectations and aging self-perceptions, has received recent attention in studies with older adults (Levy & Myers, 2004; Levy, Slade, May & Caracciola, 2006; Sarkisian, Hays, Berry & Mangione, 2001; Sarkisian, Hays & Mangione, 2002) to explain why they engage/disengage in preventative health behaviours or adhere to rehabilitative intervention regimes.

In this study, we are examined in how general aging expectations and self-perceptions of aging relate to the behaviour of physical activity. Among adults, “age expectations” reflect the extent to which people expect to achieve and maintain high levels of general functioning (Sarkisian, Hays & Mangione, 2002). For instance, believing that physical ability will decline for most people with advancing age is a general expectation towards the process of aging. General

aging expectations are derived greatly from an individual's social environment including dominant influences from the attitudes, beliefs and norms towards aging perpetuated by family, friends and health care providers (Levy, 2003). In certain cases, expectations towards aging reflect dominant social stereotypes. Levy and Langer (1994) suggested that the popular stereotypes of aging in North America are predominantly negative and exposure to these negative stereotypes potentially influence general expectations of the aging process, which in turn leads to compromised healthy behaviours based on these beliefs. Horton, Baker, Côté and Deakin (2008) also presented evidence suggesting that negative aging stereotypes held by seniors can affect a variety of behaviours like nutrition (Levy & Myers) and healthcare seeking (Sarkisian, Hays & Mangione). Lacking within this body of literature is information specifying the relationship between aging expectations and physical activity levels.

Recently, studies have emerged that specifically focus on the concept of 'aging expectations' among the elderly and how these cognitions relate to their functional health and preventative health behaviours. In a study with community dwelling older adults aged 65-100 ( $n = 588$ ) investigating the relationship between expectations regarding aging, health behaviours, health service use and subsequent health, Sarkisian, Hays and Mangione (2002) found that more than 50% of participants felt that it was an "expected part of aging to become depressed, to become more dependent, to have more aches and pains, to have less ability to have sex, and to have less energy" (p. 1937). In addition, low aging expectations (more negative) were independently associated with the belief that seeking healthcare in old age was less of a priority. In another study with adults aged 65 years and older from various community based senior centers ( $n = 611$ ), having more negative expectations correlated with lower mental and physical health related quality of life (Sarkisian, Shunkwiler & Moore, 2006). In conjunction with this research, a study examining Korean adults

aged 65 years and older found that those who expected to achieve and maintain higher functioning were also more likely to participate in health promoting behaviours, which also led to higher physical and mental functioning (Kim, 2009). Among these studies, the Expectations Regarding Aging (ERA-38) survey, a valid and reliable instrument, has been used to measure and rigorously examine the association between expectations, health behaviours, health service use and subsequent health (Sarkisian, Hays, Berry & Mangione, 2002). To this point, use of the ERA-38 has measured and referred only to aging expectations although, inherent within the item pool, are questions pertaining to aging self-perceptions. There has been no attempt to use this instrument to distinguish the difference between an individual's self perceptions for age (their own attitudes and beliefs) and one's general expectations of older people and the aging process. Consequently, studies using the ERA-38 have used the instrument in its entirety collapsing self-perception items with generalized expectation items.

In sum, the common trends among these studies have been that having low expectations for aging is associated with low health behaviour levels (Sarkisian, Hays & Mangione, 2002; Sarkisian et al., 2006) and having higher expectations of aging later in life is associated with engagement in health promoting behaviours (Kim, 2009). Still, few studies have specifically examined the relationship between ERA-38 aging expectations and the physical activity levels of adults. Sarkisian, Prohaska, Wong, Hirsch and Mangione (2005) found that expectations for general health, functional independence, pain and fatigue and appearance among community residing adults (65+ yrs) were independently associated with low physical activity levels, however the cutoff point of physical activity used to dichotomize levels reflected a generally less active sample, the sample was a singular older aged cohort, and like other studies using the ERA-38,

there was no attempt to distinguish the differential effects of self-perceptions for age from generalized expectations.

The purpose of this current study was to examine the cognitive structures that have developed around an individual's internalized attitudes and beliefs towards their *own* aging. Compared to generalized aging expectations that a person understands to be true, self-perceptions deal directly with the individual views of one's own aging and how they view themselves within this process. The formation of cognitive structures about the self stem from our, "attempts to organize, summarize or explain one's own behaviour in a particular domain" (Markus, 1977, p. 63). The argument then is, if negative perceptions of aging become part of the self, predictions towards how one will experience growing older will develop, potentially influencing future behaviours as a self-fulfilling prophecy (Merton, 1957).

Evidence suggests that self-perceptions of aging across a range of age groups are predominately negative (Nelson, 2005). Recent research suggests that an association exists between the belief that health problems are inevitable in old age and the aversion to preventative health services by older adults. Using a sample ( $n = 241$ ) of older adults over 50 years of age, Levy and Myers (2004) investigated to what extent "older individuals' beliefs about their own aging predict their likelihood of engaging in preventative health behaviours over time" (p. 625). After controlling for baseline measures, those individuals with more positive self-perceptions for aging were more likely to engage in preventative health behaviours over the next 20 years (Levy & Myers). With that said, although older adult's beliefs have been investigated in relation to health behaviours, there is insufficient evidence for the relationship between self-perceptions and physical activity levels specifically.

The distinction between self and others' perceptions towards aging is consistent with similar construct distinctions in psychological theories that examine how people plan to engage in certain behaviours. For instance, the concept of *attitudes* and *social norms* from the theory of planned behaviour (e.g., Azjen, 1985) closely relate to the concept of self-perceptions and general expectations of aging. Within this theory, attitudes are defined as “the overall evaluations of the behaviour by individuals” (Conner & Armitage, 1998, p. 1431), coinciding with the concept of self-perceptions. Social norms, on the other hand, are the “person’s beliefs about whether significant others think he or she should engage in the behaviour”; the “social pressures on individuals to perform or not perform a certain behaviour” (Conner & Armitage, p. 1431), which reflects conceptual similarities to the general expectations of aging. Theoretically, intentions to do certain activities are influenced by personal attitudes and social norms independently. Therefore, it is important to distinguish between self-perceptions and general aging expectations as each psychological variable has the potential to individually effect physical activity patterns. Although previous research has examined the validity of all ERA-38 items together (Sarkisian, Hays, Berry et al., 2002), items on the ERA-38 have not to this point been dichotomized to reflect two independent constructs (i.e., general aging expectations, aging self-perceptions), nor has the validity and reliability of emergent factor structures been established for the 38 items based on respondents in the context of physical activity.

Consistent evidence has shown a relation between harbouring negative aging expectations and negative self-perceptions and less engagement in preventative health behaviours to promote successful aging. Although the current literature successfully demonstrates the effect of attitudes and beliefs on a host of health preventative behaviours among older adults, limited research has specifically isolated physical activity as a health promoting behaviour and its relationship to such

views. Furthermore, no ERA-38 study has specifically isolated physical activity as a preventative health behaviour in relation to both aging expectations and self-perceptions to explore differential effects related to each of these psychological variables.

As well, ERA-38 studies have set their sample lower age limits for age cohorts at 50 years, or 60 years and above, creating a need to examine a broader expanse of ages cross-sectionally to capture transitions from middle to older ages and to identify life stages when attitudes towards aging become more salient or influential on the physical activity levels of adults.

Using the ERA-38, this study examined the general aging expectations and aging self-perceptions as separate constructs in relation to age groups (45-54; 55-64; 65-74 yrs) and physical activity level amongst adults aged 45-74. The first purpose of this present investigation was to identify underlying factors for both constructs and to validate emergent sub-factors in a population of middle-aged and older adults for subsequent analyses. Secondly, using these reliable and valid measures, this study aimed to determine if relationships existed between (a) general aging expectation sub-factors, age and physical activity levels, and (b) aging self-perception sub-factors, age and physical activity levels. We hypothesized that the independent variables of age and activity level would interact to influence the general aging expectations and aging self-perceptions of adults. Specifically, we hypothesized that older and less active groups would report more negative (lower) general aging expectations and aging self-perceptions for the various sub-factors identified. Overall, we also expected main effects of age and physical activity levels such that less active groups would report lower general aging expectations and aging self-perceptions independent of age and older groups would report lower general aging expectations and aging self-perceptions independent of activity level.

Thirdly, we aimed to explore the predictive nature of physical activity and age to determine if these variables explained significant and unique variance in each of the general aging expectation and aging self-perception sub-factors. These analyses were intended to identify whether physical activity levels significantly influenced the psychological aging sub-factors after controlling for age. Emergent research has demonstrated the positive effects of engagement in activity on various aspects of psychological well-being in older people (e.g., Rejeski & Mihalko, 2001). That said, we believe it to be important to conduct these types of exploratory analyses to investigate the potential affect that physical activity has produced in relation to the various general aging expectations and aging self-perception sub-factors. Lastly, we explored how general aging expectation and aging self-perception sub-factors predicted the physical activity levels of adults, when entered into regression analyses alongside the variable age. These regression analyses were performed separately for each of three age groups (45-54; 55-64; 65-74 yrs) to identify the influence of aging sub-factors or physical activity levels at different life periods.

## Methods

### *Participants*

Participants included 167 adults aged 45 to 74 yrs (101 f; 66 m;  $M$  age = 59.46,  $SD$  = 8.18) selected from various locations and organizations in the Ottawa and Toronto area. Data were collected from Brockville Seniors' Games participants, from members of the Orleans Bowling Club, the Wild for Walking group located within the St. Laurent shopping centre, staff from Stouffville District Secondary School as well as community residing adults. Participants were recruited using a convenience sampling method. Permission and consent to gather data from an organization was obtained from an associate representative, and informed consent was obtained

before participation. All procedures were approved by the ethics review board at the University of Ottawa. (see Appendix D).

### *Survey Items*

All participants completed a questionnaire comprising two components – the Godin Leisure Time Exercise Questionnaire (Godin & Shephard, 1985), and the Expectations Regarding Aging Survey (Sarkisian, Hays, Berry et al., 2002). In the survey, participants also answered a number of demographic questions and provided their current age. Thirty-six percent of surveys were completed on-site and returned to investigators, 13% were distributed on-site with return by post, and 51 % were completed and submitted using an on-line survey format.

*Godin Leisure Time Exercise Questionnaire (GLTEQ)*. This self-administered questionnaire measures current levels of physical activity in metabolic equivalents (METs) by asking participants to reflect on the number of times during an average week, and the intensity, one engages in exercise behaviours (see Appendix C). A cut-point of 24 METs units is often used (Godin & Shephard, 1985) to dichotomize between active and less active participants (e.g., < 24 is considered less active, > 24 is considered active enough to meet public health recommendations; see Pereira et al., 1997 for a review of all reliability and validity measures relating to the GLTEQ).

*Expectations Regarding Aging Survey*. General aging expectations and self-perceptions for aging were measured using the Expectations Regarding Aging survey (ERA-38) (Sarkisian, Hays, Berry et al., 2002) (see Appendix C). The ERA-38 is a 38-item self-administered survey that measures 10 domains related to general aging expectations and self-perceptions for age including general health, cognitive function, mental health, functional independence, sexual function, pain, urinary incontinence, sleep, fatigue and appearance (Sarkisian et al.). It asks participants how they feel about 18 statements concerning aging self-perceptions (ASP) and 20

statements regarding general aging expectations (GAE). Items pertaining to the self-perceptions of the participant are framed through a personal lens (e.g., “I expect that as I grow older I will become less attractive”). GAE items focus on the general experiences that older people may experience (e.g., “Forgetfulness is a natural occurrence just from growing old”). On a 4-point Likert scale, participants rate how they feel about each item using ‘definitely true’ (anchored at ‘1’), ‘somewhat true’, ‘somewhat false’ and ‘definitely false’ (anchored at ‘4’). Higher values on the ERA-38 (anchored at “4”) indicate more positive GAE and ASP scores; whereas lower values (anchored at “1”) indicate more negative GAE and ASP scores (Sarkisian et al.).

Earlier ERA-38 studies (Sarkisian et al., 2001; 2007 Sarkisian, Hays, Berry et al., 2002) in which all 38 items were treated together have demonstrated adequate internal consistency and reliability, as well as content and construct validity for community dwelling adults aged 65 years and above. However, for the purpose of this study, ASP and GAE items were separated into two independent measures and reliability and validity were assessed separately for these different item dimensions.

### *Preliminary Analyses*

Participants were divided into groups based on activity level (active, and less active) and age level (45-54, 55-64, 65-74 yr) to satisfy the conditions for our independent variables of interest. Preliminary descriptive statistics were first performed to inspect the physical activity levels of the sample. The overall mean score in METS on the GLTEQ was 27.97 ( $SD = 20.97$ ). The mean for the active group was 41.54 ( $n = 95$ ;  $SD = 17.07$ , range = 24-106) while the mean score for the less active group was 10.07 ( $n = 72$ ;  $SD = 8.39$ , range = 0-23). With respect to age group, the mean GLTEQ scores were 30.44 ( $n = 54$ ;  $SD = 24.75$ ), 26.33 ( $n = 61$ ;  $SD = 18.14$ ) and 27.33 ( $n = 52$ ;  $SD$

= 19.92) for the younger (45-54 yr), middle-aged (55-64 yr) and older (65-74 yr) groups, respectively. A one way ANOVA showed no significant difference between age groups with respect to mean values in METS ( $p = 0.56$ ).

### *Planned Analyses*

Firstly, we conducted two exploratory factor analyses with varimax rotation (one for items reflecting GAE and a separate analysis for items representing ASP) to assess the underlying structure of the item pool. These analyses served to identify valid sub-factors for a) GAE, and b) ASP. Secondly, we conducted further analyses to test the internal consistency reliability of each resultant sub-factor scale. Next, we submitted the resultant valid and reliable sub-factors to multivariate analyses. Specifically, a 2 (activity group) X 3 (age group) MANOVA was performed to test whether mean differences existed between active and less active groups and between 45-54, 55-64 and 65-74 age groups on the GAE sub-factors generated from the exploratory factor analysis. Subsequently, a 2 (activity group) X 3 (age group) MANOVA was conducted to test whether mean differences existed between active and less active groups and 45-54, 55-64 and 65-74 age groups on the ASP sub-factors.

Further exploratory analyses involved a series of multiple linear regressions conducted using the sub-factors generated from the exploratory factor analyses and the variable age. First, physical activity and age variables were entered to explain variance in each of the GAE and ASP sub-factors; these analyses were also performed to assess the relative predictive power of physical activity and age for explaining expectations/perceptions within each of the three age groups (45-54, 55-64, 65-74 yr). Second, GAE and ASP sub-factors were entered into separate regression equations along with age to predict variance in the raw scores in physical activity. The last series

of regressions was conducted separately for each age group to identify differences in the predictive power of the independent variables at various life stages.

## Results

### *Factor Analyses for General Aging Expectations and Self-Perceptions of Aging from the ERA-38*

Data for all participants were employed in separate analyses for general expectations and self-perceptions. Before conducting analyses using the data from the ERA-38 survey, items 1, 9, 11 and 34 were reversed (see Appendix C) to ensure all items were consistently aligned on the Likert-scale, with lower expectations/perceptions always anchored at the same end of the scale.

*General aging expectations.* An exploratory factor analysis was conducted on the 20 expectation items. We used several well-recognized criterion to test the factorability of the GAE items. Firstly, 19 out of 20 items correlated at least 0.3 with at least one other item suggesting reasonable factorability. The Kaiser-Meyer-Olkin test of sampling adequacy was 0.90, above the recommended level of 0.6, and the Bartlett's test of sphericity was significant,  $\chi^2(190) = 1748.2, p < 0.05$ . The diagonals of the anti-image correlation matrix were all over 0.5 and communalities were all above 0.42.

The principal component extraction method was used to identify underlying factors from the 20 GAE items. Using retention criteria of eigen values  $> 1.0$ , the initial solution revealed four factors explaining 41.2%, 10.1%, 5.8% and 5.5% of the variance respectively. Using a varimax rotation, a recursive process was used to obtain the final solution. Items for „Decreased energy in older people is just part of nature taking its course’, „As people get older they worry more’, ‘It’s a normal part of aging that older people have trouble sleeping’, ‘Old age is a time to enjoy life’, „When people get older, they need to lower their expectations of how healthy they can be’, „Having more aches and pains is an accepted part of aging’, and „Every year that people age, their

energy levels go down a little more' were removed from the factor solution as they did not reach a primary factor loading of 0.4. The item „Needing to use adult diapers is just an expected part of getting old' was removed from the factor solution due to its lack of relatedness to other items within the same factor. All items that were removed were not included in subsequent analyses. The final solution produced three distinct factors which explained 69.7% of the variance (see Table 1). We assigned titles to each sub-factor based on the common theme among items within the group. Factor 1 was labeled as „Satisfaction/Contentment with Aging' and included four items relating to the quality of life throughout the aging process. Factor 2 was labeled as „Physical Function with Aging' and included five items pertaining to the functionality of the body throughout the aging process. Factor 3 was labeled „Cognitive Function with Aging' and included three items relating to memory and cognition throughout the aging process. In all cases, cross-loading values for retained items were less than 0.39.

*Insert Table 1 about here*

*Aging self-perceptions.* An exploratory factor analysis was conducted with the 18 ASP items. As was the case with the first factor analysis conducted, several criteria were used to test the factorability of the ASP items. All 18 items correlated 0.3 with at least one other item, the Kaiser-Meyer-Olkin test of sampling adequacy was 0.87, and Barlett's test of sphericity was significant,  $\chi^2(153) = 1147.6, p < 0.005$ . The diagonals of the anti-image correlation matrix were all over 0.8 and the communalities were all above 0.48. Using a principle component extraction method and the criteria of retaining factors with eigen values  $>1.0$ , the initial solution demonstrated five factors explaining 11%, 7.1%, 6.2%, 5.6%, and 4.4% of the variance, respectively. Using varimax rotation, a recursive process was used to delete items to arrive at a final solution. The items „When I get older I expect I will be able to do everything I want to', „I expect that as I get older I will

enjoy my life', 'I expect that as I get older I will become more dependent on others', 'I expect that as I get older my quality of life will decrease', and 'I expect that as I get older I will get depressed', were removed because the difference between primary and cross-loaded values was less than 0.2. The items, 'I expect that as I get older I will always be able to take care of myself', 'I expect that as I get older I will become less attractive', and 'When I get older I expect I will have more trouble sleeping', were removed because their associations with other items in the same factor were questionable. The final solution produced three distinct factors which explained 67.3% of the total variance (see Table 2). Factor 1 was labeled 'Self-Perceived Functional Health with Aging' and included five items relating to one's general functioning throughout the aging process. Factor 2 was titled 'Self-Perceived Social Health with Aging' and included three items pertaining to the social relationships one may experience throughout the aging process. Finally, Factor 3 was labeled 'Self-Perceived Sexual Health with Aging' and included 2 items relating to one's sexuality during the aging. In all cases, cross-loading values for retained items were less than 0.30.

*Insert Table 2 about here*

*Composite scores and descriptive statistics for sub-factor scales.* Overall, these analyses indicated that three distinct sub-factors (comprising 12 items) underlied GAE responses and that these factors demonstrated high internal consistency. Furthermore, analyses produced three distinct sub-factors from the 18 ASP items that also demonstrated good internal consistency. We calculated mean scores for the six sub-factors (three for GAE, three for ASP) based on mean items which had their primary loadings on each factor. Higher scores indicated more positive expectations/perceptions for aging. Descriptive statistics for these six composite variables are presented in Table 3. An approximate normal distribution was evident for all composite scores, thus the data were well suited for parametric statistical analyses.

*Insert Table 3 about here*

### *Multivariate Analyses of Variance*

Multivariate analyses of variance (MANOVAs) were conducted separately for GAE and ASP, to determine whether expectations/perceptions differed as a function of physical activity level and age group. First, a 2 (activity group) X 3 (age group) MANOVA tested the hypothesis that age and activity level interact to effect the GAE of adults. The dependent variables were „Satisfaction/Contentment with Aging’, ‘Physical Function with Aging’ and „Cognitive Function with Aging’. The multivariate test of between group differences revealed a marginally significant result for the main effect of activity group (Wilk’s Lambda = 0.95,  $p = 0.05$ ). Post-hoc examination found marginally significant differences between physical activity groups for „Satisfaction/Contentment’,  $F(1,141) = 3.54$ ,  $p = 0.06$ , partial  $\eta^2 = 0.01$ , and „Cognitive Function’,  $F(1,141) = 1.64$ ,  $p < 0.05$ , partial  $\eta^2 = 0.04$ . Pairwise comparisons depicted that the active group reported higher expectations for satisfaction and contentment ( $M = 3.19$ ,  $SD = 0.58$ ) than less active ( $M = 3.01$ ,  $SD = 0.57$ ) participants, and that the active group reported higher expectations for cognitive function ( $M = 2.56$ ,  $SD = 0.68$ ) than less active ( $M = 2.31$ ,  $SD = 0.51$ ) participants. No other main effects or interaction effects were significant.

Next, a 2 (activity group) X 3 (age group) MANOVA was conducted to test whether age and activity level interact to effect ASP of adults. Dependent variables were „Self-Perceived Functional Health with Aging’, ‘Self-Perceived Social Health with Aging’ and „Self-Perceived Sexual Health with Aging’. Results for the multivariate test of between group differences were non-significant for age group,  $F(2, 140) = 0.56$ ,  $p = 0.76$ , and activity group,  $F(1, 140) = 2.23$ ,  $p = 0.08$ , nor was there evidence of any significant interactions,  $F(2, 140) = 1.35$ ,  $p = 0.23$ .

*Predicting Aging Expectations and Self-Perceptions Using Physical Activity and Age*

In this section, we examined the relative predictive power of physical activity and age variables in explaining variance in the three GAE sub-factor scores (i.e., „Satisfaction/Contentment’, ‘Physical Function’, „Cognitive Function’) and the three ASP sub-factor scores (i.e., „Self-Perceived Functional Health’, ‘Self-Perceived Social Health’, „Self-Perceived Sexual Health’). Using raw scores from the GLTEQ and age as the independent variables, a series of linear regressions was separately conducted for each of the three age groups within the study (45-54, 55-64 and 65-74 yr).

*Predicting GAE sub-factors by age group.* The first series of regressions pertained to the *45-54 yr old group*. Regression models were significant for each of the three sub-factors. Results indicated that the two predictors explained 11.2% of the variance in „Satisfaction/Contentment’ for the 45-54 age group,  $F(2, 51) = 3.23, p < 0.05$ . Although the beta for age was non-significant ( $\beta = -0.22, p = 0.11$ ), physical activity scores significantly and positively predicted „Satisfaction/Contentment’ expectations ( $\beta = 0.27, p = 0.047$ ). With respect to „Physical Function’ expectations, the two predictors explained 12.8% of the variance,  $F(2, 51) = 3.75, p < 0.05$ . Although the beta for age was non-significant ( $\beta = -0.20, p = 0.13$ ), physical activity scores significantly and positively predicted participants’ „Physical Function’ expectations ( $\beta = 0.31, p = 0.02$ ). Results for „Cognitive Function’ indicated that the two predictors explained 15.6% of the variance for the 45-54 age group,  $F(2, 51) = 4.70, p < 0.05$ . In this case, beta for physical activity scores was non-significant ( $\beta = 0.15, p = 0.25$ ), yet age significantly and negatively predicted participants’ ‘Cognitive Function’ expectations ( $\beta = -0.37, p = 0.006$ ).

The second series of regressions focused on the *55-64 yr old cohort*. Results indicated that each of the three models for „Satisfaction/Contentment’, „Physical Function’, and „Cognitive

Function' expectations were non-significant, all  $F$ s (2,58) < 1.89, all  $p$ s > 0.18. The final series of regression analyses related to the *65-74 yr old cohort*. Results showed a marginally significant model in which the two predictors explained 10.4% of the variance in 'Satisfaction/Contentment' for the 65-74 age group,  $F(2, 49) = 2.84, p = 0.06$ . Although the beta for physical activity scores was non-significant ( $\beta = -0.11, p = 0.43$ ), age significantly and negatively predicted 'Satisfaction/Contentment' expectations ( $\beta = -0.31, p = 0.03$ ). Neither the regression model explaining 'Physical Function' expectations, nor the model explaining 'Cognitive Function' expectations reached significance for the oldest cohort, both  $F$ s (2,49) < .45, both  $p$ s > .94.

*Predicting ASP sub-factors by age group.* None of the regressions pertaining to the three age groups yielded a model that reached significance; all regression models were non-significant for 'Self-Perceived Functional Health', 'Self-Perceived Social Health', and 'Self-Perceived Sexual Health', all  $F$ s < 2.16, all  $p$ s > .14.

#### *Regression Analyses using GAE and Age to Predict Physical Activity Levels*

A multiple linear regression was conducted to determine if age and the three GAE sub-factors ('Satisfaction/Contentment', 'Physical Function', 'Cognitive Function') significantly predicted GLTEQ scores. Results indicated that the model was non-significant,  $F(4, 162) = 1.46, p = 0.22$ . We performed an additional regression using only two independent variables – age and 'Physical Function with Aging'. (This was because inspection of Pearson correlations between the three expectations variables and physical activity were significant for 'Physical Function',  $r(165) = 0.17, p = 0.01$ , but proved non-significant for 'Satisfaction/Contentment',  $r(165) = 0.12, p = 0.05$  and 'Cognitive Function',  $r(165) = 0.10, p = 0.09$ .) The result of the regression indicated a marginally significant model where the two predictors explained 3.2% of the variance,  $F(2, 164) = 2.67, p = 0.07$ . Although the beta for age was non-significant,  $\beta = -0.05, p = 0.55$ , 'Physical

Function with Aging' significantly and positively predicted participants' physical activity scores,  $\beta = 0.17$ ,  $p = 0.03$ , when analyses were collapsed across all groups in the present sample.

*Analyses by age cohort.* For each of the 45-54 yr, 55-64 yr, and 65-74 yr cohorts, we conducted similar multiple linear regressions to examine how the three GAE sub-factors along with the age variable explained variance in physical activity levels. Results for the 45-54 yr old group indicated a marginally significant model where the four predictors explained 16.3% of the variance,  $F(4, 49) = 2.25$ ,  $p = 0.07$ . Although the betas for age ( $\beta = 0.09$ ,  $p = 0.54$ ), 'Satisfaction/Contentment' ( $\beta = 0.27$ ,  $p = 0.09$ ) and 'Cognitive Function' ( $\beta = -0.25$ ,  $p = 0.25$ ) were each non-significant, 'Physical Function' significantly and positively predicted physical activity levels ( $\beta = 0.38$ ,  $p = 0.04$ ). Regression models for the 55-64 yr old group,  $F(4, 56) = 0.90$ ,  $p = 0.47$ , and the 65-74 yr old group,  $F(4, 47) = 0.71$ ,  $p = 0.59$ , were non-significant.

#### *Regression Analyses using Aging Self-Perceptions and Age to Predict Physical Activity Levels*

We conducted a multiple linear regression to determine whether age and three valid ASP sub-factors ('Self-Perceived Function Health', 'Self-Perceived Social Health', 'Self-Perceived Sexual Health') significantly predicted GLTEQ scores. Results indicated that the model was non-significant,  $F(4, 161) = 1.87$ ,  $p = 0.12$ . We inspected correlations between each of the self-perception variables and GLTEQ - 'Self- Perceived Functional Health',  $r(165) = 0.05$ ,  $p = 0.27$  did not correlate significantly, though 'Self-Perceived Social Health' correlated at a marginally significant level,  $r(165) = 0.12$ ,  $p = 0.07$ , and 'Self-Perceived Sexual Health' correlated significantly,  $r(165) = 0.20$ ,  $p = 0.01$ . These latter two variables were entered into the regression along with age to predict physical activity. The results of the regression indicated that the model explained 4.1% of the variance at a level approaching marginal significance,  $F(2,163) = 2.34$ ,  $p = 0.07$ . Although the beta for 'Self- Perceived Social Health' ( $\beta = 0.06$ ,  $p = 0.51$ ) and age ( $\beta = -0.02$ ,

$p = 0.80$ ) were non-significant, self-perceptions related to „Sexual Health’ significantly and positively predicted participants’ physical activity scores ( $\beta = 0.17$ ,  $p = 0.04$ ) collapsed across all age groups.

*Analyses by age cohort.* For each of the 45-54 yr, 55-64 yr, and 65-74 yr cohorts, we conducted similar multiple linear regressions to examine how the three ASP sub-factors along with the scale variable for age explained variance in GLTEQ scores. The regression models were non-significant for each of the three age cohorts; all  $F_s < 1.49$ , all  $p_s > .22$ .

## Discussion

The purpose of this investigation was to generate valid and reliable measures from the ERA-38 (Sarkisian, Hays &, Mangione, 2002) in relation to the GAE and ASP of adults (45-74 yrs). A further objective was to submit these measures into analyses to determine whether GAE and ASP relate to the physical activity levels of young, middle and older adults, and whether these relationships depend on age cohort.

### *Validity and Reliability of Factors within Separate General Aging Expectation and Aging Self-Perception Dimensions*

Our aim was to investigate the underlying factor structure of the ERA-38 across a broad sample that included cohorts from successive life stages, and to do so within each of the separate item pools pertaining to GAE and ASP constructs. Results revealed three valid and reliable GAE sub-factors, which we identified as „Satisfaction/Contentment with Aging’, ‘Physical Function with Aging’ and „Cognitive Function with Aging’. „Satisfaction/Contentment’ included items relating to the prospect of loneliness, depression and decline in quality of life that older people in general may experience. In terms of ‚Physical Function’, expectations pertaining to the wear and tear of the body and general physical deterioration with age were included among the items. Items

comprising „Cognitive Function’ concerned the expected forgetfulness, mental slowing and decline in memory that accompanies the aging process. Mean levels across the sample revealed that aging expectations for satisfaction and contentment were somewhat positive, meaning that our sample clearly saw the process of aging somewhat optimistically, as a time to be surrounded by others, a time to be happy and a time to experience a high quality of life; mean levels for expectations regarding physical decline and cognitive decline with aging were moderate to low, meaning that our sample somewhat saw the process of aging as a period where the function of the body and the mind is slowly deteriorating and loss of function occurs.

Three valid and reliable sub-factors emerged for ASP which were identified as „Self-Perceived Functional Health with Aging’, ‘Self-Perceived Social Health with Aging’ and „Self-Perceived Sexual Health with Aging’. For the „Self-Perceived Function Health’ sub-factor, items reflected the self-perceived forgetfulness, aches and pains, tiredness and decline in physical function that one may experience throughout the aging process. Items comprising „Self-Perceived Social Health’ pertained to the personal relationships with friends and family, anticipated personal time spent alone and experiences of loneliness (social dis-engagement) while aging. „Self-Perceived Sexual Health’ included items concerning the self-perceived sexual ability and libido experienced while one ages. The present sample demonstrated moderate mean levels for social health and sexual health aging self-perceptions, meaning that our sample saw aging as a time where it was possible to personally experience loneliness and less time spent with friends and family, as well as a decrease/loss of sexual function; finally, our sample showed low ASP for functional health, meaning that our sample viewed aging as a time where one personally experiences aches and pain, physical deterioration, loss of memory and overall decline in quality of life.

Prior validation work by Sarkisian, Hays, Berry et al. (2002) among community residing older adults over the age of 65 indicated ten separable domains for all items pertaining to the original ERA-38. Domains included general health, cognitive function, mental health, functional independence, sexual function, pain, urinary incontinence, sleep, fatigue and appearance. Unlike Sarkisian's work on the ERA-38, the current findings support the separation of the ERA-38 into two distinct measures. Furthermore, unlike earlier research using the ERA-38 where study populations tended to be >65 years of age and much less active (Sarkisian, et al., 2001; Sarkisian, Hays, Berry et al., 2002), the current study validated GAE and ASP factors for a population spanning a larger age bracket (45-74) and a study group that was generally physically active. By examining the underlying factor structure of GAE and ASP items, valid and reliable measures were derived which were submitted in further parametric analyses.

Although literature has examined the effect of harbouring positive/negative expectations (Sarkisian et al., 2001; 2005; 2006) and aging self-perceptions (Levy & Myers, 2004) on the health promoting behaviours of older adults, no study has previously examined the relationship between GAE and ASP constructs and physical activity. Therefore, following the exploratory factor analyses, generated sub-factors for both GAE and ASP were entered into MANOVAs and multiple linear regressions to examine their relation to the age and physical activity level of participants.

#### *Relationship between Physical Activity, Age, and General Aging Expectations*

A major purpose of this investigation was to determine if age and activity level interacted to effect the GAE of adults. Two set of analyses - multivariate analyses of variance, and then regressions to explain variance in expectation variables, were performed in pursuit of this objective. In the following discussion, emphasis will be placed on those findings that were replicated across analyses. In terms of the MANOVA, across our sample, we found that active

individuals reported significantly higher expectations for satisfaction and contentment, meaning that on average, active individuals expect to be less lonely, less depressed and more content with their quality of living throughout the aging process. One possibility is that active people, compared to less active people, may not simply accept that a normal and natural part of growing older encompasses a decline in quality of life, increased loneliness and less time spent with friends and family. In terms of these results, it might be rationalized that physical activity endeavors may create social opportunities for adults as they age. The presence of these opportunities could lead to higher expectations as one expects to be surrounded by others, in turn, adding to their quality of life. Multiple linear regressions were conducted to complement our original MANOVAs, thus, age and activity level were entered into the model to examine predictive pathways for each GAE sub-factor. Results demonstrated that a higher level of physical activity positively predicted satisfaction and contentment among 45-54 year olds, even after controlling for the unique variance attributed to age, thereby suggesting that physical activity is associated to expectations relating to prospective loneliness, time spent socially and the quality of life as one grows older amongst the younger adults, but not among older cohorts. It is important to respect the alternative explanation, that is, these findings could also reflect that positive expectations specific to satisfaction and contentment as one gets older encourages an individual to be more active at present, though we did not find any support for this hypothesis in the exploratory regression analyses in the current study. If this explanation were viable, positive aging expectations could create a sense of control over the aging process, engendering a mindset where individuals feel that they have the capacity to still be active.

Our discussion now focuses on findings that proved significant in one set of analyses, but were not replicated in a second. Regression analyses showed that physical activity positively

predicted physical function aging expectations, after controlling for the unique variance attributed to age, but only for the youngest age cohort (45-54 yrs). Although important, these findings need to be interpreted cautiously as these results were not replicated within our multivariate analyses because results failed to show an interaction between physical activity and age for physical function. According to our MANOVA results, active individuals also reported significantly more positive expectations for cognitive function than less active individuals, demonstrating that activity level is related to expectations for processes of aging that encompass memory and mental health. To explain, active people may be less likely to accept that forgetfulness and mental slowness are expected aspects of aging, than less active people. One possible explanation for this finding is that individuals are capable of maintaining cognitive health during the aging because of the psychological and physiological benefits attributed to chronic physical activity, and by doing so, active individuals optimize their mental capacity throughout the aging process. On the other hand, another possible explanation may be that higher aging expectations for mental capacity may also create a sense of control throughout the aging process, and because of this control, individuals feel they still have the capacity to be physically active. Although significant as a main effect in the MANOVA irrespective of age group, this finding was not replicated in our complementary regressions analyses with each of the age cohorts. Overall, our regression results suggest that physical activity in the youngest adult cohort appears to be associated to certain expectations (i.e., satisfaction and contentment, physical function) but has no effect on expectations related to mental functionality as people age. Further investigation with the „Cognitive Function’ sub-factor is needed to determine the relationship between physical activity levels and GAE relating to mental functionality.

Our regression analyses results demonstrated that outside the 45-54 age cohort, physical activity appeared to have no bearing on the aging expectations of older adults. Across the two older age cohorts (55-64 and 65-74 yrs), physical activity was found to be a non-significant determinant for the satisfaction and contentment, physical function and cognitive function aging expectations. One might have expected these relationships to be more salient among the older adults in our sample, especially when one considers evidence for increasingly negative attitudes and views towards the aging process as we grow older (Levy, 2003). Perhaps older adults, individuals who have experienced growing older, do not view or experience physical activity as a buffering mechanism towards processes that accompany aging. Furthermore, it is possible that the absence of results is because a significant portion of our sample was pulled from a seniors sporting event (55+), reflecting a population where being active throughout the lifespan comes as second nature. Therefore, the measurement of GAE and ASP may have not been representative of the lifestyle of all senior athletes, given that a notable portion of our sample comprised somewhat active adults.

In sum, our findings suggest that for our youngest cohort, physical activity is associated to aging expectations regarding satisfaction/contentment with life, and may be important to other aging expectations as well. Importantly, expectations are linked to future intentions for behaviour (Courneya & McAuley, 1996), thus, those adults in the youngest group who are currently active and who also have higher expectations for aging may continue to be active throughout life due to optimistic future expectancies.

#### *Relationships between Physical Activity, Age, and Aging Self-Perceptions*

Another major purpose was to examine if age and activity level interact to effect the three identified ASP. In our study, however analyses showed significant results for GAE but not for

ASP. One possible explanation stems from the difference between GAE, reflecting a societal view of aging, and ASP, a variable that directly relates to evaluation of the self (Ajzen, 1985). Self-presentation research suggests that those with past histories of failure (e.g., less active individuals), desire to present themselves in a way that demonstrates enhanced levels of self-esteem, social approval, and other social rewards (Schlenker, 1975). In the case of our study, perhaps less active individuals, who we might expect to also have lower self-perceptions for aging, inaccurately reported positive perceptions for aging which led to no interactions between our physical activity and ASP variables.

Although prior research has demonstrated that increases in negative aging perceptions reduces involvement in healthy behaviours (Levy, 2003; Levy, Hansdorff, Hencke, & Wei, 2000; Levy, Slade & Kasl, 2002), these studies did not specifically look at the relationship to physical activity. Due to the fact that our sample was overall generally active in a physical context, one possible explanation for the non-significant ASP results could be that active adults less readily acknowledge a relationship between physical activity and the ASP derived from the ERA-38.

#### *Examining how Expectations and Self-Perceptions Predict Physical Activity Levels*

The last purpose of our study was to explore variance in physical activity levels using age and the GAE and ASP sub-factors as predictor variables. According to social cognitive theory (Bandura, 1986), behaviours such as physical activity, are more likely to occur when individuals expect that the behaviour will lead to positive outcomes. When one considers research for increasingly negative attitudes and views toward aging as we grow older (Levy, 2003; Levy et al., 2000; 2002) and the tendency of older individuals to expect that the aging process is negatively inevitable (Goodwin, Black & Satish, 1999), we believe it was important to conduct these types of

exploratory analyses to investigate the potential effect that negative/positive GAE and ASP have on physical activity levels.

Results showed that only the general aging expectation pertaining to physical function positively predicted current physical activity levels, after controlling for unique variance attributed to age, for the 45-54 year-old group. However, it is important to note that the amount of variance explained was low, and the regression model was at a level of marginal significance. With respect to ASP sub-factors, sexual health positively predicted physical activity levels for adults aged 45-74 years, after controlling for the unique variance due to age. This suggests that self-perceptions for sexual health as one grows older positively predict current physical activity levels of adults. One possible explanation for this finding is that because sexual activity is considered a physical activity (Health Canada, 2006), already having higher perceptions for sexual health may correlate to the maintenance and future intent to be generally physically active. Cautiously we note that the amount of variance explained by the sexual health variable was low, and that the regression model was only marginally significant.

#### *Limitations and Future Research*

Findings in this present study reflect a sample of adults aged 45-74 years that might be considered generally active, as the overall mean ( $M = 27.97$ ) GLTEQ level was above the identified cut point ( $\geq 24$ ) identified by Godin and Shephard (1985) as active enough to receive health benefits. As it was our aim to examine data from both active and less active adult participants in relation to our proposed hypotheses, it is possible that the contrasting effect we hypothesized to emerge between activity groups was not completely inherent within our sample. As well, a significant portion of our active sample consisted of seniors sport participants who may have different perceived experiences compared to the rest of the sample. Therefore, we emphasize

caution in generalizing findings until results have been replicated in future research that examines differences between active and less active groups for GAE and ASP variables with an emphasis in the distinction between activity cohorts. Perhaps measuring physical activity levels along a low-moderate-high spectrum would help to create a better distinction among groups for GAE and ASP beliefs. As well, to enhance reliability of reported physical activity levels, an objective measure (e.g., observational or pedometer) could be used, allowing for a more accurate distinction between cohorts given that self-report measures for physical activity can be influenced by a number of factors (e.g., age, social desirability; Vanhees et al., 2005).

Our efforts to recruit from social organizations in the community may have resulted in a sample of participants who find various means to be socially engaged, participate in activities that defer cognitive decline or engage in activities that ensure a degree of contentment which potentially lead to optimistic feelings towards the aging process irrespective of whether they are physically active or not. Considering some of the non-significant findings in our study, perhaps the relationship between GAE/ASP and the physical activity levels of adults is not direct in nature but moderated by another variable. For instance, it is possible that variables like optimism could moderate the relationship between expectations/self-perceptions of aging and the physical activity levels among aging cohorts, and there is potential value for future research to investigate such moderating pathways. Finally, prospective research might explore actual behavioural outcomes that arise from certain aging expectations, but particularly satisfaction/contentment with life, physical function and cognitive function expectations.

### *Conclusion*

In conducting exploratory factor analyses for both GAE and ASP from the ERA-38, our current findings produced reliable and valid sub-factors that can be utilized for studies with

generally active adult populations. Results revealed that among 45-54 yr olds, activity level is associated with differences in aging expectations relating to satisfaction and contentment, a finding that was apparent across both MANOVA and regression analyses. As well, there was some evidence that current physical activity levels positively predicted aging expectations related to physical functioning among 45-54 yr olds. Although not replicated across both types of analyses, some evidence showed that being more active was associated with higher aging expectations for cognitive function than currently being less active. Although the current study found few results in relation to the 55-64 and 65-74 yr old groups, results of this study demonstrated that levels of general aging expectations relating to physical functioning, especially for the youngest adult cohort, predicted the current physical activity levels of adults.

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Table 1

*Factor Loadings and Communalities for the 12 Retained General Aging Expectation Items from the ERA-38 (N = 167) Based on a Principle Component Analysis with Varimax Rotation*

Item	M (SD)	Satisfact/ Content	Physical Function	Cognitive Function	Communalities
Being lonely is just something that happens when people get old.	3.25 (.76)	.84			.73
Becoming more lonely is a natural part of the aging process.	3.32 (.73)	.85			.77
Quality of life declines as people age.	2.90 (.84)	.71			.59
It's normal to be depressed when you get older.	2.38 (.67)	.74			.60
When people grow older, one thing or another is going to go wrong with their body.	1.73 (.63)		.84		.84
Part of aging is different parts of you breaking down.	1.82 (.71)		.89		.89
There isn't any way to escape the physical deterioration of aging.	2.40 (.89)		.55		.55
Age slows people down.	2.15 (.74)		.64		.64
The human body is like a car: when it gets old, it gets worn out.	2.22 (.79)		.58		.58
It's an accepted part of aging to have trouble remembering names.	2.30 (.85)			.86	.81
Forgetfulness is a natural occurrence just from growing old.	2.37 (.85)			.88	.85
It is impossible to escape the mental slowness that happens with age.	2.69 (.81)			.74	.73
Variance		46.66	13.65	9.40	
Cronbach Alpha		.84	.84	.88	

*Note.* Items were presented on a 4-point Likert scale where items anchored at “1” represented negative expectations and items anchored at “4” represented positive expectations.

Table 2

*Factor loadings and Communalities for the 10 Retained Aging Self-perception Items from the ERA-38 (N = 166) Based on a Principle Component Analysis with Varimax Rotation*

Item	<i>M (SD)</i>	Self-Perceived Functional Hlth.	Self-Perceived Social Hlth.	Self-Perceived Sexual Hlth.	Communalities
I expect that as I get older I will become more forgetful.	1.93 (.66)	.57			.39
I expect that as I get older it will become more difficult to do my daily activities.	2.19 (.62)	.70			.60
I expect that as I get older I will have more aches and pains.	1.75 (.69)	.76			.60
I expect that as I get older I will not be able to work as well as I do now.	1.90 (.69)	.79			.69
I expect that as I get older I will get tired more quickly.	1.78 (.61)	.78			.68
I expect that as I get older I will spend more time alone.	2.51 (.86)		.87		.78
I expect that as I get older I will spend less time with friends and family.	2.93 (.80)		.82		.69
I expect that as I get older I will become lonelier.	2.79 (.80)		.75		.71
I expect that as I get older my sexual desire will decrease.	2.19 (.80)			.88	.83
I expect that as I get older my body's ability to have sex will decrease.	2.28 (.84)			.80	.77
Variance		39.98	16.73	10.55	
Cronbach Alpha		.80	.79	.78	

*Note.* Items were presented on a 4-point Likert scale where items anchored at “1” represented negative perceptions and items anchored at “4” represented positive perceptions.

Table 3

*Descriptive Statistics for the General Aging Expectation and Aging Self-perception Sub-factor Variables*

Sub-factor Variable	<i>M</i>	<i>SD</i>	<i>Skewness</i>	<i>Kurtosis</i>
General Aging Expectations Sub-factors				
Satisfaction/Contentment	3.08	.63	-.41	-.40
Physical Function	2.07	.59	.23	-.37
Cognitive Function	2.45	.75	.21	-.28
Aging Self-perception Sub-factors				
Self-Perceived Functional Health	1.91	.49	.25	-.19
Self-Perceived Social Health	2.74	.69	.09	-.46
Self-Perceived Sexual Health	2.24	.74	.48	-.02

Article 2: Placing the Blame on Age: Investigating the Effect of General Attributions  
towards Age and Physical Activity Status on How Adults Make Age Attributions  
Following Failure

## Abstract

Using a sample of 177 adults (107 f, 70 m;  $M$  age = 60.1; range = 45-74), a series of exploratory factor analyses were conducted to validate surveyed items from the Causal Dimension Scale for Aging (Analysis 1) and to determine the underlying factor structure of the scale. From Analysis 1 emerged the measure „General Attributions towards Age’ (GATA) which was entered into *ANOVAs* using various physical activity (PA) scenarios (Analysis 2) to determine whether PA and GATA interact to influence the reported likelihood of age as a cause for failure to be physically active for participants aged 45-64 yrs. The same *ANOVAs* were also conducted for the age groups 45-54 yrs, and 55-64 yrs separately to detect possible differences between life stages. Analysis 2 revealed that for adults 45-64 yrs, less active individuals with stable/ uncontrollable GATA reported a stronger likelihood of age as a cause for failure to be physically active in a gym, in recreational/community programs and in unstructured/spontaneous PA settings. Analysis 2 also demonstrated that for the 45-54 yr old group, less active individuals with stable/uncontrollable GATA reported a stronger likelihood of age as a cause for failure to be physically active in an unstructured/spontaneous PA setting, and for the 55-64 yr old group, less active individuals with stable/uncontrollable GATA reported a stronger likelihood of age as a cause for failure to be generally physically active.

*Keywords:* causal dimension, physical activity, aging attributions, general aging attributions

Placing the Blame on Age: Investigating the Effect of „General Attributions towards Age’ and Physical Activity Status on How Adults Make Attributions Following Failure

With the health of older adults being a top priority in Canada, investigating the causes for an age-related decline in physical activity among this cohort is warranted. Specifically, it is important to investigate the reason for low participation levels to gain a better understanding of the barriers and motivators experienced by an aging cohort. When Sarkisian, Prohaska, Wong, Hirsch and Mangione (2005) investigated the relationship between negative aging expectations and physical activity, they commonly blamed declining activity on the notion of ‚misattributions’ or ‚overattributions’ to the aging process. The misattribution of problems to old age, otherwise known in the literature as *age attributions*, is a term that demonstrates the tendency of individuals to blame problems on the aging process, rather than on other extenuating circumstances (Levy, Ashman, & Slade, 2009). Making attributions to causes that are uncontrollable, for instance age, may also serve to shift the cause of an outcome away from sources that are central to the self to sources away from the self (As cited in Maruna & Mann, 2006). According to Kart (1981), “overattribution of symptoms to the aging process directs the attention of the elderly person away from the real disease and/or environmental factors that may affect health” (p.78). Older adults’ ‚misattributions’ or ‚overattributions’ for their decline in health to symptoms of the aging process has been associated with less engagement with health behaviours such as regular physician visits and preventative medical services (Goodwin, Black, & Satish, 1999). Lacking within this body of literature is the relationship between making attributions to old age and the physical activity levels of aging cohorts.

Within the field of psychology, Attribution theory (Weiner, 1985) is based on the premise that individuals explain their successes and failures using causal attributions, defined as the

“perceived causes or reasons that people give for occurrences related to themselves or others” (Biddle, 1993, p.473). Weiner conceptually classified peoples’ attributions within three causal dimensions, and methodologically, attributions within these dimensions are assessed using the Causal Dimension Scale (Russell, 1982). *Locus of causality* refers to whether causality refers to causes inherent to the person, an internal attribution, or causes outside the attributor, an external attribution. *Stability* relates to either causes that are constant over time, i.e., stable attributions, or causes that are variable over time, referred to as unstable attributions. The last dimension used to classify attributions is *controllability*, which refers to causes that can be affected by the attributor or other people (i.e., controllable) or causes that cannot be changed or affected (i.e., uncontrollable). In terms of this present investigation, we are interested in the nature of attributions relating to “age”, how this particular attribution is viewed with respect to causality, stability, and controllability amongst middle and older-aged adults, and how making particular age attributions are associated with one’s failure to be less physically active.

In terms of the physical activity domain, attribution theory is relevant for understanding future behaviour and behavioural intentions by focusing on the psychological processes that an individual uses to explain why a particular outcome occurred (e.g., Why did I not attend my exercise class last week?) (Courneya & McAuley, 1996; McAuley, 1992). According to Courneya and McAuley, a person’s identification of causality along the three dimensions following event outcomes in the exercise domain is significant when the outcome is negative. For instance, failing to be physically active or engage in regular exercise may affect future expectancies to be successful within this domain. It is predicted that this is especially the case when failures are attributed to internal, stable and uncontrollable attributions. Within research pertaining to community dwelling older adults (65 and over), the attribution of age is typically conceived as

internal, stable and uncontrollable (Sarkisian, Prohaska, Davis & Weiner, 2007). This is important, because individuals who react to failure with internal, stable and uncontrollable attributions typically have negative affective responses (e.g., shame, guilt), lower intentions to do the same behaviour again, are less likely to engage in the same behaviour in the future (Covington & Omelich, 1979), and suffer detriments to future motivation (Sarkisian et al.). Thus, considering that certain attributions may prove to be problematic, we are interested in the relationship between the physical activity levels of adults and the reported strength of age being a likely cause for failure to be physically active.

Emerging studies are important as they demonstrate that among older individuals, age is a factor when making causal attributions and these aging attributions are associated with the functional health of older adults. Williamson and Fried (1996) asked 230 community dwelling adults 60 years and older to complete various physical tasks of daily living (e.g., strength, walk half a mile) and found that 20% of those who could not perform the task or had the task modified attributed their difficulties to “old age”. Levy, Ashman and Slade (2009) cross-culturally examined older adults’ tendency to make age attributions and their associated effects on aging health. They found that older adults (around 70 yrs old) from USA and Japan were more likely to make higher age attributions than younger individuals and that higher age attribution scores were significantly associated with lower physical functional health.

Another group of studies has focused on age differences in attributions between younger and older individuals. Using an *observer paradigm*, in which subjects make attributions for the performance of another person (target) rather than for their own performance (e.g., Erber, Szuchman, & Rothberg, 1990; Lachman & McArthur, 1996). Results showed that for young versus older targets, older targets were perceived as having greater performance difficulty associated with

internal, stable and uncontrollable attributions such as age. On the other hand, observers attributed failure of young targets to lack of effort and lack of intention (e.g., unstable, controllable reasons). In the present investigation, however, we are interested in how middle-aged and older adults perceive themselves, with respect to the effects of aging, and how these attributive perceptions relate to failure to be physically active. Limited research has examined self-rated attributions among older adult populations. Lachman and McArthur investigated how younger ( $M$  age = 19.1 yrs) and older ( $M$  age = 74.9 yrs) participants made attributions about hypothetical situations reflecting successful or failed event outcomes in the cognitive, physical and social domain and found that compared to younger adults, older adults made more internal attributions for their own failures compared to their successes. Furthermore, very limited research has explored the relationship between self-attributions to age and the physical activity level among older adult cohorts. A pilot intervention study (Sarkisian et al., 2007) demonstrated how attribution retraining raised physical activity levels among sedentary adults over 65 years of age. Although this study did not explore the actual attributions made by the participants and their relation to behaviour, use of a structural attribution retraining program (e.g., training adults to use modifiable attributes when characterizing sedentary behaviours) and weekly exercise classes were associated with increased walking levels and improved quality of life in sedentary older adults. Thus, attribution retraining showed the potential to change behaviour by raising physical activity levels. Based on these preliminary results, aging attributions deserve further empirical investigation regarding their potential association with the physical activity levels of adults.

The present investigation fills several voids in the literature. Although we have reviewed literature that links causal attributions to age with failure to perform cognitive and physical tasks, much of this research is based on the assumption that attributions towards age are internal, stable

and uncontrollable (e.g., Sarkisian et al., 2007). It is important for research to confirm that individuals indeed characterize reasons for the effects of aging or processes related to aging in this manner; the current investigation, therefore first examines how middle-aged and older adults view reasons for the effects of aging and aims to confirm measures that reliably and validly represent the causal dimensions attributed to aging. The current study also fills a further void in the literature in that limited research has specifically isolated physical activity failure as an event and its relationship to aging attributions. Furthermore, the majority of studies dealing with aging attributions set their sample lower age limits for age cohorts at 50 or 60 years and above, or have used a younger comparison group when investigating age as a factor, failing to capture successive age stages in adulthood. The present study therefore will examine a broader expanse of ages cross-sectionally to capture possible transitions in age attributions across younger, middle-aged and older adult groups. To our knowledge, no study exists that has specifically compared physically active and less active cohorts with respect to aging attributions for failure outcomes in the physical activity context. The present study, therefore, aims to do this; understanding potential differences between active and inactive individuals for the likelihood of making age attributions is important as it may help pinpoint influences of inactivity especially in terms of how age is seen as a cause of inactivity.

The general aim of the current investigation was to explore the nature of aging attributions made by middle aged and older adults following hypothetical failures in a physical activity context. However, in the lead up to this, the first purpose of the current study (Analysis 1) was to understand how adults view the reasons for the effects of aging. We attempted to identify valid and reliable measures to capture the essence of how adults generally view various dimensions of aging attributions, by conducting factor analyses on our own modified version of the Causal Dimension

Scale (Russell, 1982) for aging. No research has previously validated measures for how adults view various reasons for the effects of aging, with the intention of employing such measures in subsequent analyses to better understand the likelihood of individuals attributing age as a cause for failure in a physical activity context. The second purpose of this study (Analysis 2) was to determine if relationships exist between physical activity levels and the reported strength of age being a likely cause for failure in a physical activity context, and whether these relationships are a function of how individuals generally view reasons for the effects of aging. Thirdly, to detect possible differences between life stages, we aimed to determine how these relationships varied for 45-54 yr olds and 55-64 yr olds.

Given these purposes, the following overarching research questions directed the study: first, do emergent constructs from the Causal Dimension Scale for aging for how adults generally view various dimensions of aging attributions conceptually align with Russell's Causal Dimension Scale or would a novel measurement emerge to explain how individuals generally view reasons for the effects of aging? Secondly, does the reported strength of age being a likely cause for failure in a physical activity context differ according to current physical activity status (active, less active), and is this relationship a function of how individuals generally view dimensions of aging attributions? Third, do these relationships change as a function of age, such that there might be differences between middle-aged or older adults?

## Methods

### *Participants*

Participants included 177 adults aged 45 to 74 yrs (107 f; 70 m;  $M$  age = 60.1,  $SD$  = 8.2) selected from various locations and organizations in and around Ottawa and Toronto. Data were collected from Seniors' Games participants, from members of local bowling clubs, walking

groups, secondary school staff, as well as community residing adults. Participants were recruited using a convenience sampling method. Permission and consent to gather data from an organization was obtained from an associate representative, and informed consent was obtained from each participant prior to data collection. All procedures were approved by the REB at the University of Ottawa (see Appendix D). Thirty-four percent of surveys were completed on-site and returned to the investigators, 12% were distributed on-site with later return by post, and 54% were completed and submitted using an on-line survey format. The same participant pool was used in Analysis 1 and Analysis 2.

### *Survey Items*

All participants completed a questionnaire comprising two components, presented in the following order - the Godin Shephard Leisure Time Exercise Questionnaire (Godin & Shephard, 1985), the Attributions for Physical Activity Questionnaire, and the Causal Dimension Scale for Aging, which was our modified version of Russell's (1982) Causal Dimension Scale (1982). In the survey, participants also answered a number of demographic questions and provided their current age.

*Godin-Shephard Leisure Time Exercise Questionnaire (GLTEQ)*. This self-administered questionnaire measures current levels of physical activity during an average week one engages in exercise behaviours (see Appendix C). A score is calculated by weighting the frequency for each exercise behaviour by its estimated intensity in metabolic equivalents (METs) (Godin & Shephard, 1985; see Pereira et al., 1997 for a review of all reliability and validity measures relating to this instrument. A cut-point of 24 METs units is often used (Godin & Shephard) to dichotomize between active and inactive participants (e.g., < 24 is considered inactive, > 24 is considered active enough to meet public health recommendations).

*Attributions for Physical Activity Questionnaire.* The Attributions for Physical Activity Questionnaire (APAQ) (see Appendix C) was modeled on items borrowed from a study conducted by Lachman and McArthur (1986). We modeled our survey after sections in which their participants were asked to consider various hypothetical achievement situations where they were asked to make attributions concerning themselves, including self-attributions to age following a hypothesized failure. The APAQ was a close-ended, self-administered survey asking participants to report on their attributions for why they might fail in various hypothetical physical activity scenarios. The questionnaire presented participants with nine scenarios reflecting a spectrum of physical activity behaviours (including unstructured physical activity, exercise, fitness, active household chores, active transportation, daily physical activity guidelines, and structured sport, leisure and recreational activities; see Appendix C) and subjects were asked to imagine themselves failing in that particular event. Following each of the nine hypothetical prompts, participants were then asked „How real is this scenario for you in terms of its possible occurrence’ and were required to respond on a 7-point Likert anchored at “1” (*very unrealistic scenario*), and “7” (*very realistic*). For each scenario, participants were then asked to make judgments on a 7-point Likert scale for each of seven listed attribution items to indicate how unlikely or likely they believed that item might have been the cause for failure . Responses were anchored at “1” (*very unlikely cause*) and “7” (*very likely cause*). The seven attribution items collectively represented various causal dimensions (Weiner, 1985) and reflected the literature on barriers to physical activity reported by older adults (e.g., Booth, Bauman, & Owen, 2002). For all nine scenarios, attribution items consistently pertained to motivation, age, social constraints, time, ability, effort, and task difficulty. Although seven attribution items were presented following each physical activity scenario, only the attribution *age* was used in our present analyses. The presence of the other attribution items

served to contextualize the specific attribution to age among a host of other reasons to explain failure to be active. Specifically, the four *age* attribution items were phrased as follows: „because age has slowed me down’, ‘because I am too old to exercise at a gym’, „because I feel too old to be active’, and „because at my age these activities are not for me’.

*Causal Dimension Scale for Aging.* The Causal Dimension Scale for Aging (CDSA) is a self-administered modified version of Russell’s (1982) 9-item Causal Dimension Scale (CDS) (see Appendix C). The CDSA was presented to participants after the Attributions towards Physical Activity Questionnaire (APAQ; Analysis 2) due to the nature of items in each survey instrument. In the CDS, participants are asked to consider various achievement situations consisting of an outcome (success or failure) and are then presented with nine semantic differential scales (with three scales representing each of locus of causality, stability and controllability). For each success or failure outcomes, participants evaluate the perceived cause of this event by circling a number from one to nine. In a similar manner, our CDSA presents the *process of aging* as the event and participants make personal judgments about the various reasons for the effects of aging. Participants are prompted nine times by phrases pertaining to aging, which include: *‘I find the effects of age are...’, ‘I find aging to be...’, ‘Aging is something that...’, ‘I find the effects of age represent...’, and ‘Aging is something that is...’*. Participants are presented with nine semantic differential scales, with three scales representing each of the causal (attribution) dimensions. Like Russell’s CDS, three of the semantic differential scales are anchored at „internal-external’, three are anchored with stable-unstable, and three are anchored with „controllable-uncontrollable’. For each of the nine scales, participants were asked to evaluate the cause of the effects of aging by circling a number from one to nine, with “1” and “9” representing opposite ends on the respective scale. Item ordering along with their semantic anchors are presented in Table 1. Item three and

item five were reversed prior to data analyses to ensure that scores for these items measure consistently with other items within their scale. For the stability (items 3, 6 and 8) and controllability dimensions (items 2, 4 and 9), responses of one to four represent a more unstable/controllable view of the aging process where as responses of six to nine represent a more stable/uncontrollable view. For the locus of causality dimension (items 1, 5 and 7), responses of one to four represent a more stable/uncontrollable view of the aging process where as responses of six to nine represent a more unstable/controllable view.

*Insert Table 1 about here*

#### Analysis 1

To exhibit sufficient validity for the CDSA, a series of exploratory factor analyses were conducted to examine the emergent factor (or dimensional) structure of the 9-item scale. Specifically, the exploratory factor analyses were conducted to: a) assess if the 3 causal dimensions (locus of causality, stability, controllability) were inherent within the factor structure; b) examine if the underlying factor structure is similar to that of Russell's albeit in a different attributional context; c) determine the unique underlying factor structure and associated measure for the CDSA and if the measure demonstrated adequate internal consistency reliability. The first in a series of factor analyses were three, forced one-factor analyses for each causal dimension identified by Russell (1982) (locus of causality, controllability and stability). These factor analyses were utilized as initial screening tools, along with evaluation of each causal dimension's internal consistency reliability to assess if the items within each causal dimension loaded together on the same factor as conceptualized. Next, a series of further exploratory factor analyses were used to further confirm emergent factor structures from the CDSA taking into consideration the initial screening analyses. These sequential analyses were used to develop a composite score that

captures the nature of how our participants view attributions towards the effects of aging which could be utilized in further parametric analyses.

### *Analysis I Results*

#### *Preliminary Results*

On the whole, the sample reported a mean of 28.11 ( $SD = 20.95$ , range = 0 to 106) METS units on the GLTEQ. This indicates that the mean physical activity scores for our sample was above the cut-point to meet public health recommendations (Godin & Shephard, 1985), and our results pertaining to the factor validity of our CDSA should therefore be considered with respect to an overall physically active population.

#### *Exploratory Factor Analyses for the Causal Dimension Scale for Aging*

Data for all participants were employed into each of the series of exploratory factor analyses.

*Forced one-factor solutions for the three causal dimensions.* A series of exploratory forced one-factor analyses was conducted for each of the three causal dimensions along with internal consistency analyses to determine the coherency of the proposed constructs and to screen for problematic items. For locus of causality, the items reflected in aspects of myself/dependent on the situation I am in, represent something about me/others, and outside of me/inside of me were entered into a forced one-factor analysis using the principle component extraction method to determine if items from this dimension loaded together on the same factor. The final solution for the three locus of causality items explained 44.9% of the variance. Factor loadings for the two former items were strong (both  $> 0.72$ ), although outside of me/inside of me ( $-0.53$ ) did not load strongly. For locus of causality, internal consistency analyses indicated an unacceptably low alpha value of 0.03 for these three items. However, removal of the latter item led to a 0.38 alpha increase for locus of causality. Furthermore, this latter item proved to be problematic as further exploratory

analyses demonstrated that it alternatively loaded quite strongly (-0.57) with items on a different scale (stability).

For controllability, the items, controllable/uncontrollable, my responsibility/others' responsibility and a reason that can intentionally/unintentionally be used to explain life's successes or failures were entered into a forced one-factor analysis using the principle component extraction. The final solution explained 46.3% of the variance. Factor loadings for the two former items were strong (both  $> 0.71$ ) as expected, however, a reason that can intentionally/unintentionally be used to explain life's successes or failures loaded at a marginal level (-0.42). However, exploratory analyses showed that this latter factor did not load any better as a fourth item alongside other items in each of the locus of causality and stability factors.

For stability, the items, variable over time/stable over time, changeable/unchanging, and permanent/temporary were entered into an exploratory forced one-factor analysis using principle component extraction. The final solution explained 44.8% of the variance. Factor loadings for the former two items were strong (both  $> 0.81$ ) as expected, however, the latter item permanent/temporary demonstrated a very low loading value (0.03). Subsequent tests of internal consistency with these three items also showed that Cronbach alpha values substantially increased by 0.21 with deletion of the latter item.

Overall, the series of exploratory factor analyses and subsequent inspection of alpha levels for each scale revealed that the item „Aging is something that is outside of me/inside of me' and „I find the effects of age to be permanent/temporary' were problematic in terms of factorial validity and reliability. Moreover, due to potential problems caused by reverse scoring (as these two items were the only items reverse scored to align with other items), the above mentioned items were not included in our next set of open exploratory factor analyses.

*Open exploratory factor analysis.* Excluding these two problematic items, an open exploratory factor analysis was conducted on the seven remaining items from the CDSA. To test the factorability of the seven items, several well-recognized criteria were used. Firstly, all items correlated at least 0.23 with one other item suggesting reasonable factorability. Second, the Kaiser-Meyer-Olkin test of sampling adequacy was 0.56, close to the recommended level of 0.6, and the Bartlett's test of sphericity was significant,  $\chi^2(21) = 91.97, p < 0.05$ . The diagonals of the anti-image correlation matrix were all over 0.48, supporting the inclusion of each item in the factor analysis. Finally, the communalities were all above 0.51, demonstrating that each item shares some common variance with other items. Given the results of the aforementioned assumption measures, the open exploratory factor analysis was conducted with the seven items.

We employed the principle component extraction method using the criterion of retaining factors with eigen values greater than 1.0. The initial solution showed three factors explaining 60.6% of the variance. Using varimax rotation, a recursive process was used to obtain the final solution. The item something about me/others was deleted from the factor structure as the item cross-loaded on more than one factor (i.e., the difference between primary and cross-loaded values was less than 0.2). The final solution produced two factors which explained 51.1% of the variance (see Table 2). All cross-loaded values were less than 0.34 and 0.12 for Factor 1 and Factor 2, respectively.

*Insert Table 2 about here*

Internal consistency for each of the factors was examined using Cronbach alphas. The alpha for Factor 1 was moderate but acceptable at 0.56 and the alpha for Factor 2 was low at 0.42. Deletion of items did not achieve any further increases to alpha levels. With these results in mind, Factor 2 did not appear suitable for entry into further analyses as reliability of the scale was low.

Moreover, it was difficult to conceptually reconcile the two items in Factor 2 as one item, theoretically belonging to the locus of causality dimension, pertained to an internal/external attribution and the other item, conceptually a part of the controllability dimension, related to controllable/uncontrollable attribution. Factor 1 appeared more conceptually coherent; however, we wished to perform a final exploratory factor analysis to confirm its validity.

*Forced one-factor analysis with all original items.* An exploratory, forced one-factor analysis was conducted with the nine original items from the CDSA. To test the factorability of the nine items, several well-recognized criteria were used. Firstly, all items correlated at least 0.2 with one other item suggesting reasonable factorability. Second, the Kaiser-Meyer-Olkin measure of sampling adequacy was 0.54, close to the recommended level of 0.6, and the Bartlett's test of sphericity was significant,  $\chi^2(21) = 141.47, p < 0.05$ . The diagonals of the anti-image correlation matrix were all over 0.50, supporting the inclusion of each item in the factor analysis. Although some of the communalities were low, due to the exploratory nature of the factor analysis, all nine items were entered into the exploratory forced one-factor analysis.

We used the principle component extraction method to extract one fixed factor from all nine items. The initial solution indicated that the factor explained 20.55% of the variance. A final solution was obtained after deleting five items because their factor loadings were not above 0.5. The remaining five items are displayed in the factor loading matrix in Table 3. The final solution produced a factor that explained 43.25% of the variance. We labeled this factor „General Attributions towards Age’ because it included four items that captured the essence of participants’ outlook on various attributions for the effects of aging.

*Insert Table 3 about here*

Internal consistency for „General Attributions toward Age’ was examined using Cronbach alpha and results indicated that reliability for the factor was moderate but acceptable ( $\alpha = 0.58$ ; Hair, Black, Babin, Anderson & Tatham, 2007). Increases in alpha were not achieved by eliminating more items. A composite score was created for the „General Attributions towards Age’ factor based on the mean of the items loading on this factor. Higher scores indicated a more stable/uncontrollable perspective towards the effects of aging whereas lower scores indicated a more unstable/controllable view of the aging process. Descriptive statistics are presented in Table 3. Overall, these analyses indicated the emergence of the „General Attributions towards Age’ construct, a distinct factor derived from four items on the CDSA which captures our participants’ views on attributions relating to the effects of aging and validly and reliably measures the level of stable/unstable and controllable/uncontrollable views one has towards the aging process. An approximate normal distribution was evident for the composite score and data in the current study, thus, data were well suited for subsequent use in parametric statistical analyses.

### *Discussion*

To explore the nature of attributions made toward the effects of aging by middle-aged and older adults, a series of exploratory factor analyses was conducted to examine the emergent structure of the 9-item CDSA, a modified version of the CDS (Russell, 1982). Prior validation work by Russell among university undergraduate students indicated a three-dimensional structure to the original CDS. Dimensions included locus of causality, stability and controllability. To assess if the three causal dimensions present in Russell’s CDS emerged within the CDSA, three separate forced-one factor analyses for each three-item dimension were conducted. Our results showed that the three causal sub-scales borrowed from the CDS were not inherent within the CDSA. In particular, several items showed poor internal consistency reliability on their proposed scale, there

was evidence that items cross-loaded on scales to which they should not have been affiliated, (e.g., „Aging is something that is outside of me/inside of me’), and items that loaded at less than satisfactory levels on their proposed scale (e.g., „I find aging to be a reason that can intentionally/unintentionally be used to explain life’s successes or failures’). Results suggested that attributions towards the effects of aging made by middle-aged and older adults were not understood along a distinct three-factor structure as previously conceptualized. These results might be explained by the fact that we were measuring attributions in a different context than Russell (aging), and it is possible that the emergence of a three-factor model was not inherent within this attributional context. In light of this, further exploratory factor analyses were conducted to determine the unique factor structure and associated measure for the CDSA.

Through an open exploratory analysis using all nine items, a coherent factor emerged which we further validated by conducting a forced one-factor analysis. For adults aged 45-74, results revealed a valid and reliable four-item factor relating to how middle-aged and older adults view the aging process in terms of its controllability, changeability, variability and personal responsibility. Based on the nature of these items and the concepts underlying each measurement, we identified the emergent construct as „General Attributions towards Aging’ (GATA); a variable measuring how adults attribute towards the effects of aging.

Mean levels for the constituent items comprising the „General Attributions towards Aging’ (GATA) construct revealed that, for our sample, middle-aged and older adults viewed the effects of aging as highly uncontrollable, moderately variable, fairly unchanging and somewhat their responsibility. Earlier work with aging attributions (Sarkisian at al., 2007) has not, to the best of our knowledge, empirically measured attributions characterizing peoples’ perspective on aging, but only assumed the nature of these attributions. Thus, this study is innovative in that we created,

validated and utilized a variable to measure middle-aged and older adults' attributions towards the effects of aging. In terms of prior research, attributions that are internal, uncontrollable and stable with respect to age are assumed to be detrimental to motivation (Sarkisian et al.). In relation to this work, although our sample perceives the process of aging as uncontrollable and to some extent unchanging, the overall mean level for the GATA variable demonstrates a somewhat positive outlook or facilitative view towards the process of aging. Given that having more optimistic (i.e., facilitative) views are associated with greater positive psychological outcomes and life satisfaction (Scheier, Carver, & Bridges, 2001) there is value in using this instrument to measure facilitative/debilitative views of the aging process for aging cohorts considering the tendency for attitudes towards the aging process to be predominately negative (Nelson, 2005). According to our composite measure GATA, facilitative GATA is associated with scores for controllability over effects of aging, aging effects that are perceived as changeable, a perception that aging effects are variable and not stable, and that one perceives responsibility for the effects of age.

## Analysis 2

As little age attribution research with adults in a physical activity context has been conducted to date, this analysis explored the characteristics of adults who report age as a likely cause for failure to be physical activity. In doing so, another purpose of this analysis was to utilize „General Attributions towards Aging' in parametric analyses with failure scenarios from the Physical Activity Questionnaire. It was our aim to use this variable to investigate if GATA and physical activity interact to effect the way adults make attributions for age following failure to be physically active. Within research pertaining to older populations, the specific attribution to age is typically conceived as internal, stable and uncontrollable (Sarkisian et al., 2005). According to attribution theory (Weiner, 1985), making this type of attribution especially detrimental to

motivation (Sarkisian et al., 2007) and future intentions for behaviour (Courneya & McAuley, 1996). Conceptually, we believed that individuals who viewed aging as a stable and uncontrollable event (i.e., debilitating) would be more likely to report age as a cause for failure, because the specific attribution to age is conceived as internal, stable and uncontrollable. Thus, we hypothesized that adults who viewed the process of aging as more stable and uncontrollable (i.e., scoring high for „General Attributions towards aging’) would be more likely to report age as a cause for failures to be physically active.

### *Preliminary Analyses*

For the nine physical activity scenarios presented, frequency counts were conducted to determine the scenarios that were unrealistic to participants. In total, five scenarios were excluded from our analyses due to mean levels being lower than 3.8 for a realistic scenario. The sample as a whole found „Recently I have not been as physically active as I would like to be’ (*Recently Inactive Scenario*) ( $M = 3.84, SD = 2.11$ ), „I do not go to the gym as frequently as I would like’ (*Infrequent Gym Scenario*) ( $M = 4.48, SD = 2.41$ ), „Often I do not participate in physically active recreational or community programs’ (*Program Inactivity Scenario*) ( $M = 3.96, SD = 2.40$ ) and „I rarely engage in unstructured or spontaneous physical activities or sports’ (*Unstructured/Spontaneous Inactivity Scenario*) ( $M = 4.87, SD = 2.28$ ) to be the most realistic scenarios; these same four scenarios were also rated as most realistic in each of our age groups. To ensure a sample that acknowledged realistically they had somewhat failed to be physically active, only individuals who reported  $\geq 3$  on the personally realistic measure for each of the physical activity scenarios were included in our analyses. Following the application of the  $\geq 3$  cut point for realistic failure, we discovered that the sample size for the older age group (65-74 yrs) was low compared to the two other age groups identified (45-54 yrs and 55-64 yrs) due to few older adults reporting failure

towards the physical activity scenarios presented. Due to the sample size required for subsequent analyses of variance (ANOVAs), the older age group was not included in our analyses, leaving us with two age groups: 45-54 yrs, and 55-64 yrs.

Two distinct categorical variables were created for each of the four physical activity scenarios by conducting median splits on the GLTEQ data (forming active and less active groups) and the „General Attributions towards Age’ (GATA) data (unstable/controllable GATA and stable/uncontrollable GATA). Thus, for each scenario, the sample was stratified to test the hypothesis that activity level and GATA will interact to influence the likelihood of adults reporting age as cause for one’s failure to be physically active. Descriptive analyses were conducted for physical activity levels and levels of reported GATA, collapsed across all participants, and then for each of the age group and physical activity cohorts. These data are presented in Table 4.

#### *Planned Analyses*

For each of the four scenarios, a series of two activity group (active, less active) X two „GATA’ (unstable/controllable GATA, stable/uncontrollable GATA) mixed ANOVAs were conducted. In all cases, the dependent measure was the reported strength of age being a likely cause for failure to be physically active for each scenario. For each scenario, the mixed ANOVA was first conducted to test whether physical activity level and GATA interact to influence the reported strength of age being a likely cause for failure to be physically active for all participants aged 45-64 yrs. To tease out possible differences between life stages, the same analyses were next conducted for the age group 45-54 yrs, and 55-64 yrs, separately.

*Analysis 2 Results**Recently Inactive Scenario*

Mixed ANOVA results indicated a marginally significant effect for physical activity,  $F(1, 70) = 3.24, p = 0.07$ , partial  $n^2=0.04$ , with less active individuals ( $M = 2.66, SD = 1.63$ ) reporting a stronger likelihood of age as a cause for physical activity failure than active individuals ( $M = 2.16, SD = 1.31$ ) after acknowledging that they had been recently less active than they would like to be,  $p = 0.07$ . Results indicated no significant main effect for „GATA’,  $F(1, 70) = 2.20, p = 0.14$ , nor significant results for the interaction effect,  $F(1, 70) = 2.23, p = 0.14$ .

*Specific analyses by age group.* For the 45-54 year-old group, a two (activity group) X two (GATA group) ANOVA indicated a significant main effect for physical activity,  $F(1, 38) = 5.83, p = 0.02$ , partial  $n^2 = 0.13$ , with less active individuals ( $M = 2.90, SD = 1.57$ ) reporting a stronger likelihood of age as a cause for physical activity failure than active individuals ( $M = 1.87, SD = 1.08$ ),  $p = 0.02$ . For the main effect of GATA, results indicated no significant main effect,  $F(1, 38) = 0.18, p = 0.68$ , nor was there a significant interaction effect,  $F(1, 38) = 0.27, p = 0.61$ . The same analysis for the 55-64 year-olds indicated no significant main effect for physical activity level,  $F(1, 28) = 0.12, p = 0.73$ , but a significant main effect for „GATA’,  $F(1, 28) = 5.42, p = 0.03$ , partial  $n^2 = 0.16$ , with individuals who viewed aging as a stable and uncontrollable process ( $M = 3.10, SD = 1.82$ ) reporting a stronger likelihood of age as a cause for physical activity failure than individuals who view the aging process as more unstable and controllable ( $M = 1.98, SD = 1.16$ ),  $p = 0.03$ . Results also indicated a significant interaction between physical activity level and „GATA’,  $F(1, 28) = 11.56, p = 0.001$ , partial  $n^2 = 0.29$ . The interaction is plotted in Figure 1. Visual inspection of the trends indicates that less active individuals with stable/uncontrollable GATA reported a stronger likelihood of age as a cause for physical activity failure than active stable/uncontrollable

individuals and, conversely, less active individuals with unstable/controllable GATA individuals reported a weaker likelihood of age as a cause for physical activity failure than active individuals with unstable/controllable GATA. Further inspection with confidence intervals for physical activity and GATA sub-groups revealed that less active individuals with stable/uncontrollable GATA,  $M = 4.00$ , 95% CI [2.96, 5.04], reporting a stronger likelihood of age as a cause for physical activity failure to be physically active than less active individuals with unstable/controllable GATA,  $M = 1.25$ , 95% CI [0.28, 2.22].

*Insert Figure 1 about here*

#### *Infrequent Gym Scenario*

For the sample collapsed across 45-64 years, results indicated no significant main effects for physical activity,  $F(1, 79) = 2.46$ , and „GATA’,  $F(1, 79) = 0.86$ ,  $p = 0.36$ . Results indicated a marginally significant interaction between physical activity and „GATA’,  $F(1, 79) = 3.73$ ,  $p = 0.05$ , partial  $\eta^2 = 0.05$ . The interaction is plotted in Figure 2. Visual inspection of the trends indicates that the difference between individuals with stable/uncontrollable GATA and unstable/controllable GATA for reporting a stronger likelihood of age as a cause for physical activity failure depends on physical activity status. Further inspection with confidence intervals found that less active individuals with stable/uncontrollable GATA,  $M = 1.96$ , 95% CI [1.57, 2.35], reported a significantly stronger likelihood of age as a cause for physical activity failure to go to the gym than active individuals with stable/uncontrollable GATA,  $M = 1.33$ , 95% CI [0.83, 1.83].

*Insert Figure 2 about here*

*Specific analyses by age group.* For the 45-54 year-old group, a two (activity group) X two („GATA’ group) ANOVA indicated no significant main effect for physical activity,  $F(1, 34) = 2.87$ ,  $p = 0.10$ , or „GATA’,  $F(1, 34) = 0.28$ ,  $p = 0.60$ , nor were there any significant interactions,

$F(1, 34) = 0.23, p = 0.64$ . The same analysis for the 55-64 year olds indicated no significant main effects for physical activity,  $F(1, 41) = 0.79, p = 0.38$ , or „GATA’,  $F(1, 41) = 0.02, p = 0.89$ , nor were there any significant interactions,  $F(1, 41) = 0.26, p = 0.61$ .

#### *Program Inactivity Scenario*

Results indicated a marginal main effect for physical activity,  $F(1, 75) = 3.72, p = 0.06$ , partial  $n^2 = 0.05$ , with less active individuals ( $M = 2.01, SD = 1.56$ ) reporting a significantly stronger likelihood of age as a cause for physical activity failure than active individuals ( $M = 1.46, SD = 1.02$ ),  $p = 0.06$ . For „GATA’, results indicated a significant main effect,  $F(1, 75) = 9.45, p = 0.00$ , partial  $n^2 = 0.112$ , with individuals with stable/uncontrollable GATA ( $M = 2.17, SD = 1.53$ ) reporting significantly stronger likelihood of age as a cause for physical activity failure than individuals with unstable/controllable GATA ( $M = 1.30, SD = 0.85$ ),  $p = 0.001$ . Results indicated a marginally significant interaction,  $F(1, 75) = 3.46, p = 0.06$ , partial  $n^2 = 0.04$ . The interaction is plotted in Figure 3. Visual inspection of the trends indicates that the difference between individuals with stable/uncontrollable GATA and individuals with unstable/controllable GATA for reporting a stronger likelihood of age as a cause for physical activity failure depends on physical activity status. Further inspection with confidence intervals for physical activity and GATA sub-groups revealed that less active individuals with stable/uncontrollable GATA,  $M = 2.71, 95\% CI [2.21, 3.21]$ , reported a significantly stronger likelihood of age as a cause for failure to be physically active than active individuals with stable/uncontrollable GATA,  $M = 1.64, 95\% CI [2.16, 1.11]$ , and less active individuals with unstable/controllable GATA,  $M = 1.31, 95\% CI [0.70, 1.93]$ .

*Insert Figure 3 about here*

*Specific analyses by age group.* For the 45-54 year-old group, a two (activity group) X two (GATA group) ANOVA indicated a marginally significant main effect for physical activity,  $F(1,$

31) = 3.49,  $p = 0.07$ , partial  $n^2 = 0.10$ , with less active individuals ( $M = 2.30$ ,  $SD = 1.65$ ) reporting a significantly stronger likelihood of age for physical activity failure than active individuals ( $M = 1.44$ ,  $SD = 0.80$ ),  $p = 0.07$ . For the main effect of GATA, results indicated no significant main effect,  $F(1, 31) = 0.78$ ,  $p = 0.39$ , nor were there any significant interaction effects,  $F(1, 31) = 0.18$ ,  $p = 0.68$ . The same analysis for the 55-64 year-olds indicated no significant main effect for physical activity level,  $F(1, 40) = 1.55$ ,  $p = 0.22$ . Results indicated a significant main effect for GATA,  $F(1, 40) = 4.31$ ,  $p = 0.04$ , partial  $n^2 = 0.10$ , with individuals with stable/uncontrollable GATA ( $M = 2.10$ ,  $SD = 1.62$ ) reporting a significantly stronger likelihood of age as a cause for failure to be physically active than individuals with unstable/controllable GATA ( $M = 1.24$ ,  $SD = 0.56$ ),  $p = 0.04$ . There was no significant interaction between physical activity and GATA,  $F(1, 40) = 0.35$ ,  $p = 0.27$ .

#### *Unstructured/Spontaneous Inactivity Scenario*

Results indicated no significant main effect for physical activity,  $F(1, 87) = 0.10$ ,  $p = 0.75$ . Results indicated a significant main effect for GATA,  $F(1, 87) = 7.56$ ,  $p = 0.01$ , partial  $n^2 = 0.08$ , with individuals with stable/uncontrollable ( $M = 3.90$ ,  $SD = 2.17$ ) reporting a significantly stronger likelihood of age as a cause for physical activity failure than individuals with unstable/controllable GATA ( $M = 2.70$ ,  $SD = 2.03$ ),  $p = 0.01$ . Results indicated a significant interaction between physical activity and GATA,  $F(1, 87) = 4.26$ ,  $p = 0.04$ , partial  $n^2 = 0.05$ . The interaction is plotted in Figure 4. Visual inspection of the trends indicates that the difference between individuals with stable/uncontrollable GATA and individuals with unstable/controllable GATA for the reported strength of age being a likely cause for failure to be physically active depends on physical activity status. Further inspection with confidence intervals for physical activity and GATA sub-groups revealed that less active individuals with stable/uncontrollable GATA,  $M = 4.42$ , 95% CI [3.62,

5.23], reported a significantly stronger likelihood of age for failure than less active individuals with unstable/controllable GATA,  $M = 2.32$ , 95% CI [1.37, 3.26].

*Insert Figure 4 about here*

*Specific analyses by age group.* For the 45-54 year-old groups, a two (activity group) X two (GATA group) ANOVA indicated no significant main effect for physical activity,  $F(1, 34) = 0.31$ ,  $p = 0.58$ . For GATA, results indicated a marginally significant main effect,  $F(1, 34) = 3.64$ ,  $p = 0.07$ , partial  $n^2 = 0.10$ , with individuals with stable/uncontrollable GATA ( $M = 4.00$ ,  $SD = 2.17$ ) reporting a significantly stronger likelihood of age for failure to be physically active than individuals with unstable/controllable GATA ( $M = 2.71$ ,  $SD = 2.03$ ),  $p = 0.07$ . Results indicated a significant interaction between physical activity and GATA,  $F(1, 34) = 6.36$ ,  $p = 0.02$ , partial  $n^2 = 0.16$ . The interaction is plotted in Figure 5. Visual inspection of the trends indicates that less active individuals with stable/uncontrollable GATA reported a stronger likelihood of age for failure than active individuals with stable/uncontrollable GATA and, conversely, less active individuals with unstable/controllable GATA reported a weaker likelihood of age for failure than active individuals with unstable/controllable GATA. Further inspection with confidence intervals for physical activity and GATA sub-groups revealed that less active individuals with stable/uncontrollable GATA,  $M = 4.67$ , 95% CI [3.49, 5.84], reported a significantly stronger likelihood of age for failure than less active individuals with unstable/controllable GATA,  $M = 1.67$ , 95% CI [0.01, 3.33]. The same analysis for the 55-64 year-olds indicated no significant main effects for physical activity,  $F(1, 49) = 0.11$ ,  $p = 0.74$ , or „GATA’,  $F(1, 49) = 1.56$ ,  $p = 0.22$ , nor were there any significant interactions,  $F(1, 49) = 0.00$ ,  $p = 0.99$ .

*Insert Figure 5 about here*

General Discussion

The overarching purpose of this present study was to investigate the nature of age attributions made by middle aged and older adults. A series of exploratory factor analyses conducted with the CDSA revealed a valid and reliable construct, identified as „General Attributions towards Age’ (GATA), which captured how adults make various attributions towards the effects of the aging process. Given that prior research has identified making certain types of attributions towards aging as pessimistic or debilitating (i.e., internal, stable and uncontrollable) (Sarkisian et al., 2007), based on how individuals generally viewed dimensions of aging attributions, the GATA measure relates to how individuals view the process of aging in terms of the stability and controllability dimensions. Specifically, making attributions towards the effects of aging that are more stable/uncontrollable are more debilitating whereas making attributions towards the effects of aging that are more unstable/controllable are more facilitative. A further objective of this study was to explore whether the GATA measure related to how adults report the likelihood of age as a cause for failure to be physically active and if this relationship differs according to physical activity status (active, less active). Moreover, this same relationship was explored for the age groups 45-54 and 55-64 yrs separately, to see if the nature by which people attribute towards the effects of the aging process could be different with respect to life stage.

Evidence suggests that there is an association between certain causal attributions for failure in relation to aging and health behaviours among older adults (Erber et al., 1990; Levy et al., 2009). Given this, we expected that adults who report a more stable/uncontrollable view towards the effects of aging would report a stronger likelihood of age as a cause for failures to be physically active. As well, those who report being less physically active would be more likely to cite age as a cause for failure to be physically active. Again, research has implied that making more internal, stable and uncontrollable attributions are especially detrimental to motivation

(Sarkisian et al., 2007) suggesting that those who make these types of attributions are less likely engaging in, or less likely to engage in health promoting behaviour. In light of this and the fact that physical activity is a health promoting behaviour, we expected that there might also be an interaction between adults' GATA on attributions towards the effects of aging and adults' current levels of physical activity. We hypothesized that those individuals who report being less active and took a more stable and uncontrollable view towards the effects of aging would be more likely to report age as a cause of physical activity failure.

*Relationship between Physical Activity and Age Attributions Following Physical Activity Failure as a Function of GATA*

One purpose of this investigation was to determine if physical activity and GATA interacted to effect the strength of reported likelihood of age as a cause for physical activity failure. In pursuit of this objective, univariate analyses of variances were conducted for each of the four physical activity scenarios rated by our sample as realistic in terms of their possible occurrence. In the following discussion, emphasis will be placed on those scenarios with significant interactions present across the entire sample (45-64 yrs).

Based on the analyses for the *infrequent gym* scenario, we found a significant interaction between GATA and physical activity demonstrating a small to moderate effect size (Pierce, Block, & Aguinis, 2004). Specifically, less active individuals with stable/uncontrollable GATA reported making a significantly stronger attribution to age following failure to visit the gym compared to active individuals with stable/uncontrollable GATA. In other words, compared to less active peers who harbour a more facilitative outlook towards the aging process, less active individuals with stable/uncontrollable GATA reported greater likelihood that age was a cause for failure to be active in a gym setting. Interestingly, the interaction between physical activity status and general

attributions towards age appeared to be related more to differences between active and less active status amongst individuals with stable/uncontrollable GATA, than it was to differences between active and less active status amongst individuals with unstable/controllable GATA. Amongst individuals who held more stable/uncontrollable attributions towards the effects of aging, those who were physically active were less likely to report age as a reason for failing to be active at the gym.

Across the entire sample, results showed a significant interaction between general attributions towards aging and physical activity for the *program inactivity* scenario that demonstrated a small effect size (Pierce et al., 2004). Specifically, less active individuals with stable/uncontrollable GATA reported a stronger likelihood of age as a cause for failure compared to active individual with stable/uncontrollable GATA following failure to be active within a recreational and community context (i.e., walking group, canoe club), meaning that on average, those individuals who were less active and reported more stable/uncontrollable attributions towards aging were more likely to reason that age was a cause for disengagement in physically active recreational and community programs. Results demonstrated that activity status (active, less active) among individuals with stable/uncontrollable GATA made the difference in terms of reporting age as a likely cause for failure to be active within a recreational and community atmosphere.

Results for the *unstructured/spontaneous* scenario showed a significant interaction between general attributions towards age and physical activity status that demonstrated a small to moderate effect size (Pierce et al., 2004). Trends showed that the difference between individuals with stable/uncontrollable beliefs towards age and unstable/controllable beliefs towards age in terms of the likelihood of reasoning that age was a cause for failure became more pronounced amongst less

active cohorts, with less active individuals with stable/uncontrollable GATA reporting a significantly stronger likelihood of age as a cause for failure to engage in unstructured or spontaneous physical activities (i.e., pick-up basketball, shinny hockey) than less active individuals with unstable/controllable GATA.

*Findings for Age Attributions Following Physical Activity Failure as a Function of Different Life Stages (45-54 and 55-64 yrs)*

Another purpose of this investigation was to determine how the likelihood strength of reporting age as a cause for physical activity failure varied across different life stages. With respect to the *unstructured/spontaneous* scenario, results showed a significant interaction between general attributions towards age and physical activity for the 45-54 yr olds demonstrating a large effect size (Pierce et al., 2004) that was absent among 55-64 yr olds. Among the 45-54 yr olds, trends showed the difference in reported likeliness of age as a cause for failure became greater for less active individuals with stable/uncontrollable GATA compared to active individuals with unstable/controllable GATA and this reported likelihood became less for less active individuals with unstable/controllable GATA compared to active individuals with unstable/controllable GATA. Interestingly, we had found the same interaction effect in analyses across the entire sample (45-64 yrs), however, this interaction between general attributions towards age and physical activity for the unstructured scenario (i.e., pick-up basketball, shinny hockey) appears to be the most pronounced in the younger cohort.

For the *recently inactive* scenario, results indicated a significant interaction between general attributions towards age and physical activity demonstrating a large effect size (Pierce et al., 2004) among the 55-64 yr olds, whereas only a main effect for physical activity was found for 45-54 yr olds. Inspection of the trends showed that 55-64 yr old individuals with stable/uncontrollable

views towards aging reported a stronger likelihood of age as a cause for their inactivity if they were less active than if they were active, yet 55-64 yr old individuals with unstable/controllable views towards aging reported a weaker likelihood of age as a cause for physical activity failure if they were less active than if they were active. As this scenario represented physical activity in the most general sense and perhaps connected in relatedness to most individuals, it is notable that the oldest, less active individuals who believed aging to be more stable and uncontrollable process reported the strongest likelihood of age as a cause for failure.

Important to note for the *recently inactive* scenario are the divergent significant main effects for each age group. As was hypothesized, among the 45-54 yr olds it was found that less active individuals reported a stronger likelihood of age as a cause for physical activity failure than active individuals suggesting that current physical activity level is related to how younger adults make attributions towards age following failures. In contrast, no main effect for physical activity was found for the 55-64 yr olds, yet older adults with stable/uncontrollable beliefs towards age reported a stronger likelihood of age as a cause for physical activity failure than more individuals who believed aging to be a unstable/controllable process as hypothesized. Interestingly, our results suggested that physical activity status in our middle-aged adult years (i.e., 45-54 yrs), not general attributions towards age, has a greater impact on how age is viewed as a likely cause following failures to be physically active, where as the opposite may be true for older adults (i.e., 55-64 yrs).

Our validated construct, „General Attributions towards Age’, was utilized in this study to determine the general outlook that middle-aged and older adults had about various attributions towards the general effects of aging and to further understand the nature of these views and their relationship to the reported likelihood of age as a cause for physical activity failure. We had hypothesized an interaction effect between general attributions towards aging and physical activity

levels, and our results confirmed these predictions. Collapsed across the entire sample, results demonstrated that less active individuals with more stable/uncontrollable beliefs towards the process of aging compared to active individuals with more stable/uncontrollable beliefs towards the process of aging reported a significantly stronger likelihood of age as a cause for failures to be physically active at the gym, within a community or recreational context, and in settings involving and unplanned or unstructured/spontaneous physical activities. Findings for the different age groups indicated that this particular trend was pronounced amongst 45-54 yr olds in relation to the unstructured/spontaneous inactivity context, and was evident amongst 45-54 yr olds in relation to the most general of the scenarios, i.e., „recent failure to be as active as I would like to be’.

In relation to physical activity, these findings for age attributions may hint at a dangerous situation for less active individuals who believe age to be a more stable and uncontrollable process. Given that specific attributions to age following their failures are typically defined as internal, uncontrollable and stable (Sarkisian et al., 2007), individuals who harbour stable and uncontrollable attributions may demonstrate lower intentions to do the same behaviour again, are less likely to engage in the same behaviour in the future (Covington & Omelich, 1979), and will suffer detriments to future motivation (McAuley & Courneya, 1996). In terms of intervening to retrain attribution styles, based on this study it is important to focus on less active individuals with more stable/uncontrollable views who report a greater likelihood of age as a cause for failures to be physically active within a variety of contexts to encourage future intentions to be active and to ensure that appropriate intervention methods are developed for these groups.

In terms of understanding the influence of how people generally view attributions towards the effects of aging, results therefore suggest that general aging outlook affects the way in which more or less active individuals specifically report age as a cause for physical activity failure.

Specifically, results reflected that less active individuals who view aging as an uncontrollable and stable process, reported a stronger likelihood of age for various failures to be physically active. Considering the tendency for older adults to attain negative attitudes towards aging (Nelson, 2005), the GATA variable is a viable construct to empirically measure individuals general views towards the effects of aging.

#### *Limitations and Future Research*

Our findings showed that the likelihood of reporting age as a cause for failure for various physical activity scenarios depends on individuals' physical activity levels and how they view the aging process in terms of the stability and controllability causal dimensions; however, due to this study's exploratory nature, future research using the „GATA' variable is needed to affirm this. Future research could benefit from study designs aiming to measure the pathways between general attributions towards aging and intentions to be physically active in the future to infer the roles of age attributions on the physical activity level of middle-aged and older adults. In terms of our main results, the fact that mean levels for age as a likely cause for less active individuals with stable/uncontrollable GATA were higher than mean levels for active individuals with unstable/controllable GATA for some physical activity scenarios is interesting, but in terms of actual behaviour, research is needed to determine the actual behavioural implications that accompany believing that age is a likely cause for failure. It is not possible to totally understand the GATA measure without understanding the behavioural consequences of harbouring stable/unstable and controllable/uncontrollable views.

We were interested in the likelihood strength of reporting age as a cause for failures to be physically active and focus was placed on negative outcomes because these failures and associated attributions may affect future expectancies to be successful within this domain (Courneya &

McAuley, 1996). Future research would benefit from a design which includes both failure and success scenarios to measure the differences in reporting age as a likely cause for middle-aged and older adults, especially because attributions following success and failure are different (Covington & Omelich, 1979).

In our study, failure to be physically active was measured using various scenarios reflecting a broad range of physical activities. As was demonstrated in our study, age was reported as a likely cause following failures in certain scenarios. With this in mind, future research would benefit from exploring other scenario contexts to determine if certain sub-groups place are more likely to cite age as a cause for failures within certain physical activity contexts. For instance, is an individual involved in sport more likely to reason that age is a cause for failure to be active in organized soccer compared to a community walking group?

### *Conclusion*

In conducting exploratory factor analyses using our developed CDSA, our findings in Analysis 1 produced a reliable and valid construct („GATA’) that was utilized to explore how middle-aged and older adults view various attributions towards the effects of aging. In Analysis 2, through the utilization of the „GATA’ construct, a better sense was gained towards the impact of harbouring stable/unstable and controllable/uncontrollable views of aging and how this interacts with physical activity status to influence the reported likelihood of age cited as a cause by adults following failure in physical activity contexts. The results of this study revealed that across the entire sample, less active individuals with more stable/uncontrollable views towards aging compared to active individuals with more stable/uncontrollable views towards aging reported stronger likelihood of age as a cause for failures in contexts relating to a gym setting, recreation and community activities and unstructured/spontaneous activities. For the life stage analyses, these

trends were pronounced for the 45-54 yr olds following failure to be active in an unstructured/spontaneous physical activity status, whereas similar trends were most pronounced for 55-64 yr olds in relation to recent failure to be generally physically active. In conclusion, the results of this study demonstrate that for middle-aged and older adults, physical activity and „GATA’ interact to influence the reported likelihood of age as a cause for failure to be physically active in a variety of contexts.

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Table 1

*Causal Dimension Scale for Aging*

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*Instructions:* Think about how your age may have been a reason for compromised physical activity. The items below concern your impressions or opinions on the effects of aging. Circle one number for each of the following scales.

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1. I find the effects of age are:											
Reflected in aspects of myself	1	2	3	4	5	6	7	8	9	Dependent on the Situation I am in	
2. I find the effects of age are:											
Controllable	1	2	3	4	5	6	7	8	9	Uncontrollable	
3. I find the effects of age to be:											
Permanent	1	2	3	4	5	6	7	8	9	Temporary	
4. I find aging to be:											
A reason that can intentionally be used to explain life's successes or failures	1	2	3	4	5	6	7	8	9	A reason that can unintentionally be used to explain life's successes or failures	
5. Aging is something that is:											
Outside of me	1	2	3	4	5	6	7	8	9	Inside of me	
6. Aging is something that is:											
Variable over time	1	2	3	4	5	6	7	8	9	Stable over time	
7. I find the effects of age represent:											
Something about me	1	2	3	4	5	6	7	8	9	Something about others'	
8. Aging is something that is:											
Changeable	1	2	3	4	5	6	7	8	9	Unchanging	
9. I find the effects of age to be:											
My responsibility	1	2	3	4	5	6	7	8	9	Others' responsibility	

---

Table 2

*Factor Loadings and Communalities Based on a Principle Component Analysis with Varimax*

*Rotation for the 6 Retained Causal Dimension for Aging Items (N=167)*

	<i>M</i>	<i>SD</i>	Factor 1	Factor 2	Communalities
I find the effects of age are controllable/uncontrollable	6.12	2.52	.66		.46
Aging is something that is variable over time/stable over time	3.37	1.79	.56		.32
Aging is something that is changeable/unchanging	5.34	2.01	.74		.55
I find the effects of age to be my responsibility/others' responsibility	3.78	2.24	.65		.53
I find the effects of aging are reflected in aspects of myself/dependent on the situation I am in	3.99	2.04		.76	.59
I find aging to be a reason that can intentionally/unintentionally be used to explain life's successes and failures	2.28	1.31		.78	.62

Table 3

*Factor Loadings and Communalities Based on a Principle Component Analysis with Varimax*

*Rotation for the 4 Retained Causal Dimension for Aging items (N = 165)*

	<i>M</i>	<i>SD</i>	Aging Outlook	Communalities
I find the effects of age are controllable/uncontrollable	6.12	2.52	.66	.43
Aging is something that is variable over time/stable over time	3.37	1.79	.56	.30
Aging is something that is changeable/unchanging	5.34	2.01	.74	.55
I find the effects of age to be my responsibility/others' responsibility	3.78	2.24	.65	.45
Variance			43.25	
Cronbach Alpha			.58	
<i>M</i>			3.35	
<i>SD</i>			1.22	
Skewness			.07	
Kurtosis			-.05	

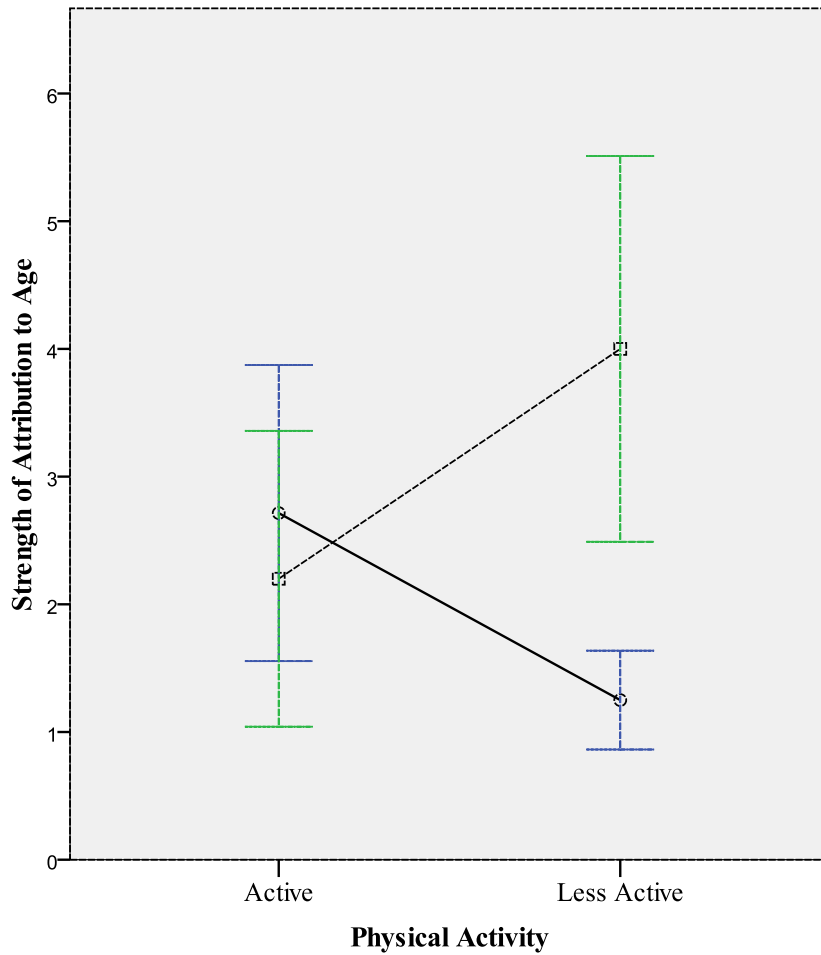
Table 4

*Descriptive Statistics for Active and Less Active Adults as a Function of Age Group*

Age (in yrs)	Active			Less Active		
	Collapsed	45-54	55-64	Collapsed	45-54	55-64
N	63	30	33	52	24	28
GLTEQ						
<i>M</i>	42.83	46.50	39.48	10.62	10.38	10.82
<i>SD</i>	17.75	21.33	13.18	8.42	9.04	8.01
General Attributions towards Age Score						
<i>M</i>	3.33	3.48	3.19	3.46	3.67	3.29
<i>SD</i>	1.11	.94	1.24	1.13	1.05	1.18

Figure 1

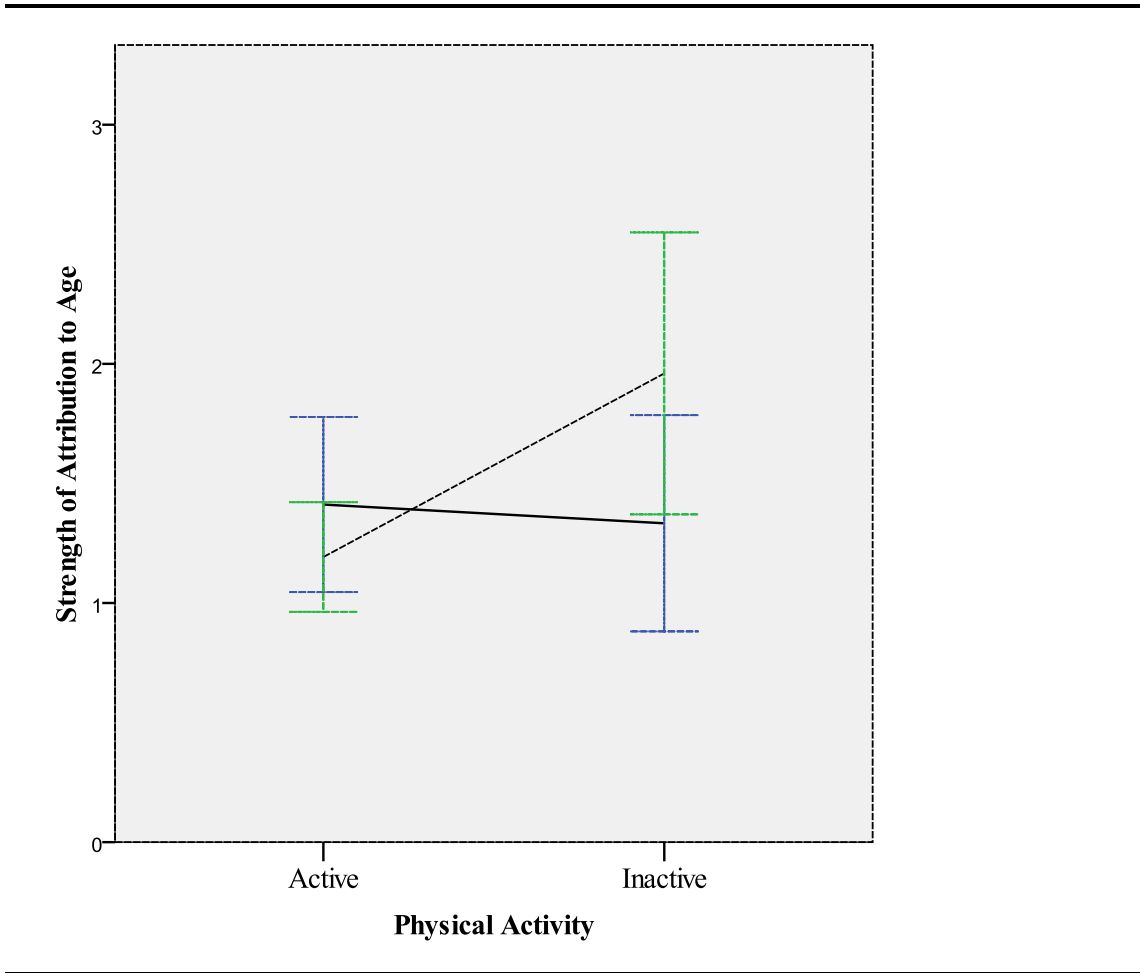
*Interaction Between Physical Activity and General Attributions towards Age for Reported Likelihood of Aging as a Cause for Failure in a Recently Inactive Scenario for 55-64 yr olds*



*Note.* Whisker bars represent upper and lower bound confidence intervals for active and less active groups.

Figure 2

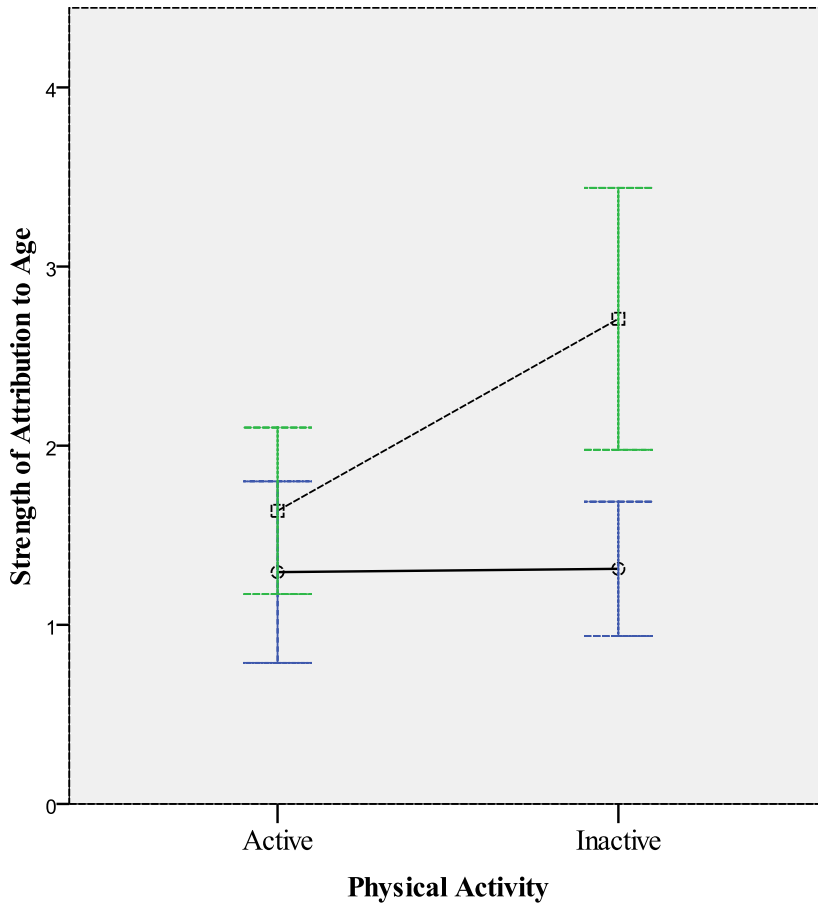
*Interaction Between Physical Activity and General Attributions towards Age for Reported Likelihood of Aging as a Cause for Failure in an Infrequent Gym Scenario for 45-64 yrs olds*



*Note.* Whisker bars represent upper and lower bound confidence intervals for active and less active groups.

Figure 3

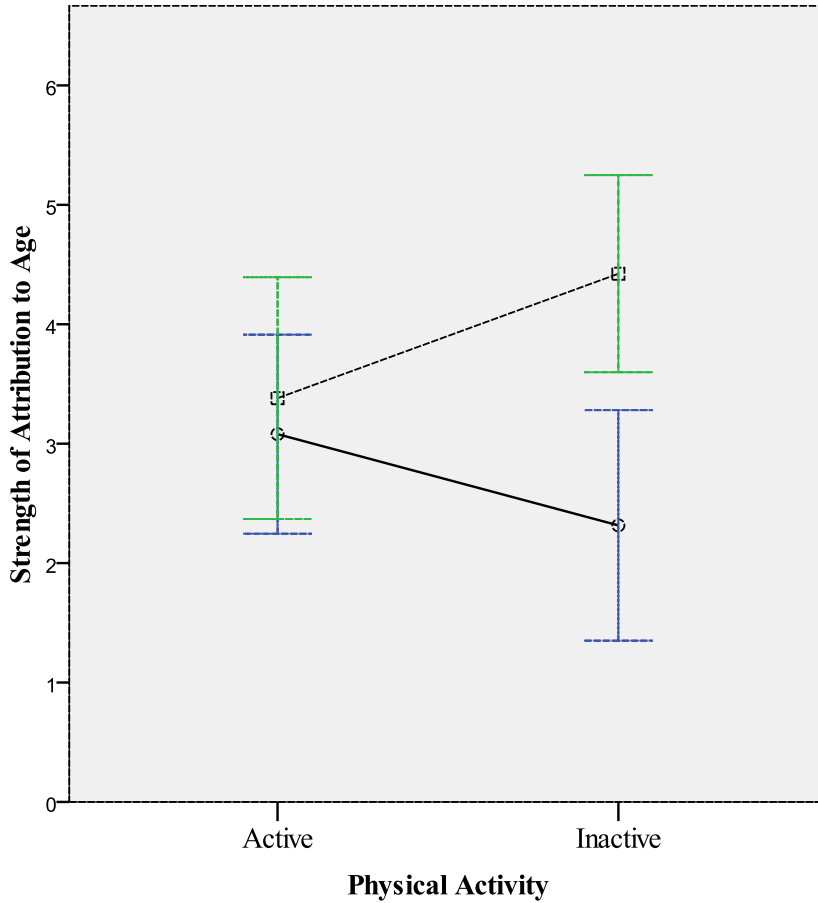
*Interaction Between Physical Activity and General Attributions towards Age for Reported Likelihood of Aging as a Cause for Failure in a Program Inactivity Scenario for 45-64 yr olds*



*Note.* Whisker bars represent upper and lower bound confidence intervals for active and less active groups.

Figure 4

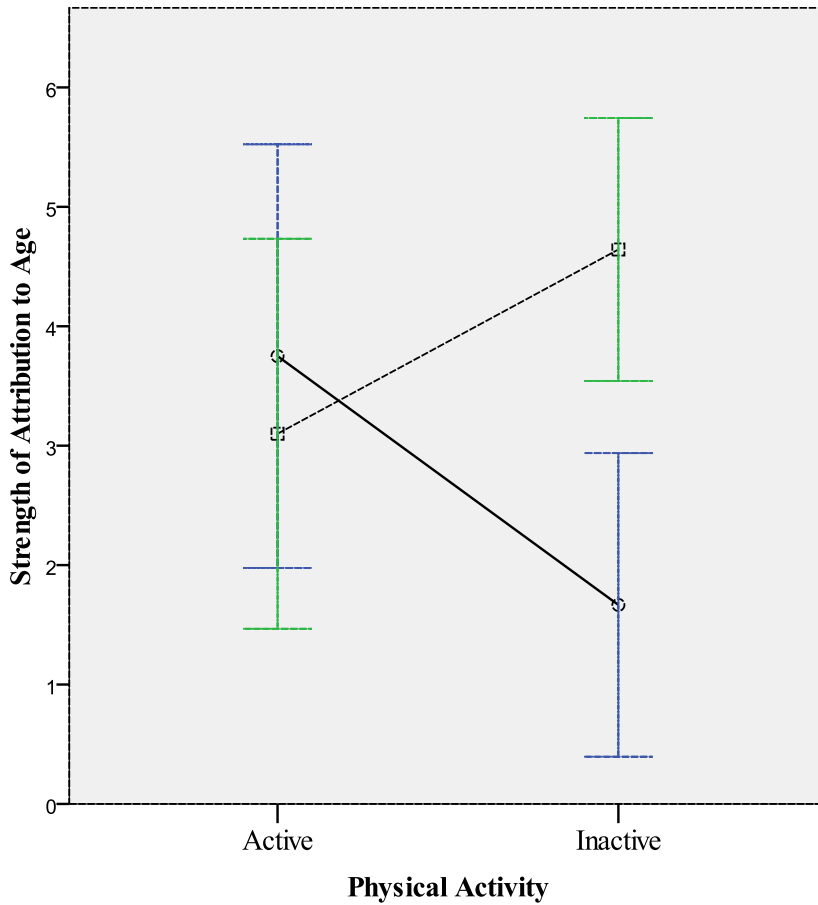
*Interaction Between Physical Activity and General Attributions towards Age for Reported Likelihood of Aging as a Cause for Failure in a Unstructured/Spontaneous Scenario for 45-64 yr olds*



*Note.* Whisker bars represent upper and lower bound confidence intervals for active and less active groups.

Figure 5

*Interaction Between Physical Activity and General Attributions towards Age for Reported Likelihood of Aging as a Cause for Failure in a Unstructured/Spontaneous Scenario for 45-54 yr olds*



*Note.* Whisker bars represent upper and lower bound confidence intervals for active and less active groups.

## Conclusion

Considering past and future trends of declining health in the aging population, it is imperative to understand older adults' disengagement from preventative health behaviours like physical activity. Despite the evidence supporting physical activity as a health promoting behaviour, barriers to physical activity, real or perceived, must be understood in order to develop new strategies to increase the physical activity levels among middle-aged and older adults. In this investigation of adults' aging expectations, self-perceptions for aging and aging attributions, it was our goal not only to explore new contexts within this field but to also gain a better understanding of some of the barriers experienced by middle-aged and older adults in hopes of advancing the extant literature surrounding negative attitudes and beliefs towards the aging process.

Considering the context of the literature surrounding aging expectations and aging self-perceptions, Study 1 was heavily influenced by the work of Sarkisian and colleagues (2001; 2002; 2005) and thus, the ERA-38 was utilized to investigate the associations between physical activity status, age and different aging expectations and aging self-perceptions. Study 1 identified reliable and valid sub-factors for both general aging expectations and aging self-perceptions for adults aged 45-74 yrs using the ERA-38. Results from Study 1 revealed that among 45-54 yr olds, being more physically active was associated with more positive aging expectations relating to satisfaction and contentment than being less active; these findings were apparent across both multivariate analyses of variance and regression analyses. As well, there was some evidence that current physical activity levels positively predicted aging expectations related to physical functioning among 45-54 yr olds. Although not replicated across both types of analyses, some evidence showed that currently being more active was associated with higher aging expectations for cognitive function than currently being less active. Although Study 1 found few results in relation to the 55-64, and 65-74 yr old age groups, results of this study also demonstrate that levels of general aging

expectations relating to physical functioning, especially for the youngest adult cohort, predicted the current physical activity level of adults.

Through the initial investigation into the literature surrounding aging expectations, we came across a term that influenced the development of our second study. When Sarkisian and colleagues (2001; 2002; 2005) investigated the relationship between negative aging expectations and physical activity they commonly referred to the notion of ‘misattributions’ or ‘overattributions’ to the aging process. The misattribution of problems to old age, otherwise known as *age attributions*, is a term that demonstrates the tendency of individuals to blame problems on the aging process, rather than on extenuating circumstance (Levy, Ashman & Slade, 2009). Inspired by interest, we began to explore this concept of ‘misattributions’ and found that making certain types of attributions to age, mainly internal, stable and uncontrollable, and especially following failure outcomes, is potentially detrimental to intention, motivation and future behaviour (Covington & Omelich, 1979; Sarkisian et al., 2007). Considering this literature, we became interested in how middle-aged and older adults generally view the effects of aging in terms of the types of attributions made towards the aging process. From the notion of ‘misattributions’ emerged two research questions: (1) if individuals make general attributions towards aging that are either stable/unstable and controllable/uncontrollable, how is reporting age as a likely cause for failure to be physically active effected by these general views towards aging and (2) is the reported likelihood of age as a cause for failure related to both the general attributions made towards the aging process and current physical activity status? From this, the overarching purpose of Study 2 was to investigate the type of age attributions made by middle-aged and older adults.

The attribution of age has been previously understood along three distinct dimensions: locus of causality, stability and controllability (Russell, 1982; Sarkisian et al., 2007). Through various

exploratory analyses to determine the underlying factor structure of the CDSA, Study 2 produced the reliable and valid construct 'General Attributions towards Age' (Analysis 1) which measures how individuals view various attributions generally towards the effects of aging. Results suggested that attributions towards the effects of aging made by middle-aged and older adults were not understood along a distinct three-factor structure, rather, they conformed to a one-factor solution reflecting stability and controllability dimensions captured by 'General Attributions towards Age'. In Study 2 (Analysis 2), the use of this variable in various analyses allowed us to gain a better sense towards the impact of harbouring more stable/uncontrollable and unstable/controllable views of aging and how this interacts with physical activity status to influence the reported likelihood of age as a cause for failure in physical activity contexts. Results revealed that across the entire sample, less active individuals with more stable/uncontrollable views compared to active individuals with more stable/uncontrollable views reported a stronger likelihood of age as a cause for failures in contexts relating to a gym setting, recreation and community activities, and unstructured/spontaneous activities. For the life stage analyses, results demonstrated that for the 45-54 yr olds, less active individuals with stable/uncontrollable views compared to active individuals with stable/uncontrollable views reported stronger likelihood of age as a cause for failure in an unstructured/spontaneous physical activity context. As well, for the 55-64 yr olds, results indicated that less active individuals with stable/uncontrollable views compared to active individuals with stable/uncontrollable views reported a stronger likelihood of age as a cause for failure to be generally physically active. In conclusion, results of Study 2 demonstrated that for middle-aged and older adults, physical activity and 'General Attributions towards Age' interacted to influence the reported likelihood of age as a cause for failure to be physically active in a variety of contexts.

Overall, the results from both studies contribute to the literature on perceived barriers and lends to a better understanding of the nature of certain barriers to physical activity experienced by middle-aged and older adults. In examining the influences of potential psychological barriers to physical activity, specifically more negative attitudes and beliefs towards the aging process, results demonstrated that current physical activity levels are effected by how some adults make expectations and attributions to age. These findings are an important step towards understanding the declining trends of physical activity experienced in adulthood. With that said, the next step will be to use the validated variables, general aging expectations, aging self-perceptions and ‘General Attributions towards Age’, in studies focusing on actual behaviour measures and how negative attitudes and beliefs of this nature coincide with the physical activity levels and age of middle-aged and older adults.

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## Appendices

## Appendix A

**LETTER OF PERMISSION FOR RECRUITMENT PURPOSES FROM COMMUNITY ORGANIZATIONS**

Dear *(insert name of contact person at community organization)*,

I am contacting you in the hope that you will consider endorsing a research project and grant permission to recruit participants from your organization.

This study is a Master's level thesis project with the School of Human Kinetics at the University of Ottawa. The purpose of this research is to understand how peoples' expectations and perceptions related to aging relate to levels of physical activity, exercise and sport in adults aged 40-69. The study will involve distribution of a questionnaire to adults who express interest in participating. In total, the questionnaire takes approximately 25 minutes to complete. The questionnaire asks participants about the amount of physical activity that they are currently involved in, how they generally view expectations for aging, and asks them to make judgments about the reasons for why they might sometimes be less physical active than they would like to be. Participants will complete the surveys and return it to the researcher on-site. If unable to complete the survey on-site, participants will instead be offered the option to take a survey to complete at home and return it using a preaddressed and prepaid envelope, or to complete the survey on-line by providing an email address. For those who provide an email address, the researchers will electronically mail an invitation to participants with a safe and secure link to the online version of the survey.

In accordance with ethical procedures at the University of Ottawa, all the information that participants provide will remain confidential and all steps will be taken to ensure the anonymity of participants during the data analyses and reporting of results. Participation in the study is entirely voluntary. If at any time a participant wishes to withdraw from the study, he or she may do so freely without penalty of any kind.

This study has the potential to identify important psychological barriers perceived by adults in regards to physical activity participation. This information could be useful for designing programs and interventions to help middle-aged and older adults to become more physically active and to increase the number of adults engaging in physical activity. Given the potential health benefits of having a more active older population, I ask you to consider granting permission to recruit adults from your organization to participate in the study. I also ask you to grant permission for the researchers to maintain a booth on-site allowing for the distribution and collection of questionnaires. The location and functioning of such a booth would be subject to your preferences, respectful of the surrounding events, and would be entirely non-disruptive. Adults would have to approach the booth to express interest in participating in the study and the researchers would not solicit participants at other venues.

As an organizational representative, I ask for your consent to permit this research by reading and signing the letter below and returning it to the investigator.

To Whom It May Concern,

My name is \_\_\_\_\_, and I represent an organizational group called \_\_\_\_\_ . I endorse this research and the researchers have my permission to distribute questionnaires to participants who are between 40 and 69 years of age and who are affiliated with my organization. I understand that this task requires about 25 minutes in total to complete. I understand that all research procedures conform to ethical procedures at the University of Ottawa and that participation in the study is voluntary, and at any time it is possible for participants to withdraw freely from the study without penalty of any kind. I agree to provide access so that the researcher may maintain an on-site table/booth on my organization's premises, which will be subject to my preferences, respectful of surrounding events and participants, and entirely non-disruptive. I understand that all interested participants will have to approach the table to discuss the research, and that they will not be solicited in undesignated areas on-site. I will allow the researcher to distribute questionnaires to members of my organization and collect completed questionnaires from them from the designated booth/table on-site.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

## Appendix B

## LETTER OF INFORMATION FOR PARTICIPANTS

Dear participant,

We have received permission from (*organization's name*) to ask you to consider taking part in a research study. This study is a Master's level thesis project in the School of Human Kinetics at the University of Ottawa looking at the types of psychological factors that influence physical activity participation in adults. Upon completion of the study, you will have the opportunity to request a summary of the findings.

This study will require you to fill out a questionnaire that takes about 25 minutes to complete and that can be returned to the researcher on-site. The questionnaire first asks about your current level of physical activity participation. It also asks you to report on statements about how you feel about growing older and generally what types of expectations you have for the aging process. Finally, you will be presented with various physical activity scenarios and asked to make judgments about the reasons for why you might sometimes be less physically active than you would like to be.

If you would like to participate in the survey but would rather complete the questionnaire at your own convenience, you may take the questionnaire with you along with a preaddressed and prepaid return envelope that the researcher provides. If you would like to participate in the survey but would rather complete the questionnaire online, you will be asked to provide a valid electronic mailing address. In this case, the researcher will email you an invitation to you to participate along with a link to a safe and secure online survey. This email address will be used for the sole purpose of electronically mailing the online version of the survey to you. Your email address will not be used for any other purpose, and will be stored safely by the primary researchers until the end of the investigation. At that time, your email contact will be destroyed. The online version of the survey is certified safe and secure and only the investigators will have access to your information.

In accordance with research ethics procedures at the University of Ottawa, all of the information that you provide will remain confidential. To ensure confidentiality, personal information will be coded and stored in a locked lab to which only the researchers will have access. You will be assigned an identification number in order to maintain your anonymity throughout the course of data collection and analysis. When the final report is written, it will be done in such a way as to conceal the identity of all participants. Inferences will be based on information collected from group data and not upon individual cases. Collected data will be used for analyses in the present study and will be kept on file for a period of ten years, after which it will be destroyed.

You must be between the ages of 40 and 69 to participate in this study. Your participation in the study is entirely voluntary. Filling out the questionnaire and returning it to the researchers would

indicate that you freely consent to participate in this study. This means that you have been informed of the requirements of the research, understand that you have the opportunity to ask questions and discuss this study, and have been assured that your information will remain confidential. If at any time you no longer wish to continue as a participant, you may withdraw freely without penalty of any kind. If you wish to withdraw from the study after submitting the questionnaire, please indicate to the researchers either verbally or in writing your intention to withdraw. Your information will be removed from the study upon your request and destroyed.

Your participation would be extremely helpful and greatly appreciated. You can contact the researchers about any part of the study at any time using the information below. Information requests or concerns about the ethical conduct of the project can be addressed to the Protocol Officer for Ethics in Research indicated below.

## Appendix C

<b>Godin-Shephard Leisure Time Exercise</b>
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<p>Considering a <b>7-day period</b> (a week), how many times on the average do you do the following kinds of exercise for <b>more than 15 minutes</b> during your <b>free time</b> (write on each line the appropriate number).</p>
--

1.)

**a) STRENUOUS EXERCISE****Times per week****(HEART BEATS RAPIDLY)**

\_\_\_\_\_

(i.e., running, jogging, hockey, football, soccer, squash, basketball, cross country skiing, judo, roller skating, vigorous swimming, vigorous long distance bicycling)

**b) MODERATE EXERCISE****Times per week****(NOT EXHAUSTING)**

\_\_\_\_\_

(i.e., fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy swimming, alpine skiing, popular and folk dancing)

**c) MILD EXERCISE****Times per week****(MINIMAL EFFORT)**

\_\_\_\_\_

(i.e., yoga, archery, fishing from a river bend, bowling, horseshoes, golf, snow-mobiling, easy walking)

2.) Considering a 7-day period (a week), during your leisure-time, how often do you engage in any regular physical activity long enough to work up a sweat (heart beats rapidly)?

OFTEN

SOMETIMES

NEVER/RARELY

1. 2. 3.



## Expectations Regarding Aging Questionnaire


- This part of the survey has questions about what you expect about aging.
- Please check the **ONE** box to the right of the statement that best corresponds with how you feel about the statement. If you are not sure, go ahead and check the box that you think **BEST** corresponds with your feelings.

	Definitely True 1	Somewhat True 2	Somewhat False 3	Definitely False 4
1. When I get older I expect I will be able to do everything I want to.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. I expect that as I get older I will become more forgetful.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. I expect that as I get older it will become more difficult to do my daily activities.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. I expect that as I get older I will spend more time alone.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. I expect that as I get older I will spend less time with friends and family.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. I expect that as I get older I will have more aches and pains.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. I expect that as I get older I will not be able to work as well as I do now.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. I expect that as I get older I will get tired more quickly.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. I expect that as I get older I will enjoy my life.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



**Part 2**

	<b>Definitely True 1</b>	<b>Somewhat True 2</b>	<b>Somewhat False 3</b>	<b>Definitely False 4</b>
10. I expect that as I get older I will become more dependent on others.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. I expect that I will always be able to take care of myself.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12. I expect that as I get older I will become less attractive.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13. I expect that as I get older I will become lonelier.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14. I expect that as I get older my quality of life will decrease.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15. I expect that when I get older I will get depressed.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16. I expect that as I get older my sexual desire will decrease.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17. I expect that as I get older my body's ability to have sex will decrease.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18. When I get older I expect I will have more trouble sleeping.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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The items below refer to older people in general.

- Please check the **ONE** box to the right of the statement that best corresponds with how you feel about the statement concerning **OLDER PEOPLE IN GENERAL**.
- If you are not sure, go ahead and check the box that you think **BEST** corresponds with your feelings.

	<b>Definitely True</b> 1	<b>Somewhat True</b> 2	<b>Somewhat False</b> 3	<b>Definitely False</b> 4
19. When people grow older, one thing or another is going to go wrong with their body.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20. Part of aging is different parts of you are breaking down.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
21. When people get older, they need to lower their expectations of how healthy they can be.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
22. It's an accepted part of aging to have trouble remembering names.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
23. Forgetfulness is a natural occurrence just from growing old.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
24. It is impossible to escape the mental slowness that happens with aging.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
25. There isn't any way to escape the physical deterioration of aging.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
26. Age slows people down.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
27. The human body is like a car: when it gets old, it gets worn out.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



**Part 2**

	<b>Definitely True</b> <b>1</b>	<b>Somewhat True</b> <b>2</b>	<b>Somewhat False</b> <b>3</b>	<b>Definitely False</b> <b>4</b>
28. Having more aches and pains is an accepted part of aging.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
29. Decreased energy in older people is just part of nature taking its course.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
30. Every year that people age, their energy levels go down a little more.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
31. Needing to use adult diapers is just an expected part of getting old.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
32. Being lonely is just something that happens when people get old.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
33. Becoming more lonely is a natural part of the aging process.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
34. Old age is a time to enjoy life.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
35. Quality of life declines as people age.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
36. As people get older they worry more.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
37. It's normal to be depressed when you are old.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
38. It's a normal part of aging that older people have trouble sleeping.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Like most people, it is likely that you do not exercise as much as you would like. In fact, even the most disciplined people have difficulties doing as much exercise as they would wish. To help us understand better the potential barriers to physical activity involvement, we would like to know your reasons for not being as physically active as you would like to be. In this section of the survey, we present several scenarios that reflect situations in which one's involvement in physical activity is compromised. For each scenario described, **please imagine yourself in that same situation**. Listed under each physical activity scenario are reasons that one may give to explain why that particular scenario. First, using the scale, we would like to know how realistic the scenario described is to you in terms of its likelihood of occurring. Second, using the 7 items listed below; **please make judgments, to the best of your ability, about the likely causes for each scenario**.

Consider the following scenario when responding to all items on the remainder of this page:

***“Recently I have not been as physically active as I would like to be.”***


	Very Unrealistic							Very Realistic
How real is this scenario for you in terms of its possible occurrence?	1	2	3	4	5	6	7	

Please make a **personal judgment** using each item listed below about the likely causes for the above occurrence. Circle the number to the right of the statement that best corresponds with how you feel about the statement:

	Very Unlikely cause							Very Likely cause
Because I do not have enough time to be physically active.	1	2	3	4	5	6	7	
Because age has slowed me down.	1	2	3	4	5	6	7	
Because I find physical activity too difficult.	1	2	3	4	5	6	7	
Because I have a lack of interest in physical activity.	1	2	3	4	5	6	7	
Because those close to me do not lead a physically active lifestyle.	1	2	3	4	5	6	7	
Because I do not have the ability to participate in physical activity.	1	2	3	4	5	6	7	
Because I do not put in the effort to be physically active.	1	2	3	4	5	6	7	

For the scenario presented at the top, please rank from 1 to 7 how important each of the possible causes is to you. Using each number only once, rank each item from 1 (**mostly likely cause**) to 7 (**least likely cause**).

- \_\_\_ Because I do not have enough time to be physically active.
- \_\_\_ Because age has slowed me down.
- \_\_\_ Because I find physical activity too difficult.
- \_\_\_ Because I have a lack of interest in physical activity.
- \_\_\_ Because those close to me do not lead a physically active lifestyle.
- \_\_\_ Because I do not have the ability to participate in physical activity.
- \_\_\_ Because I do not put in the effort to be physically active.

	<h2 style="margin: 0;">Part 4</h2>	
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Consider the following scenario when responding to all items on the remainder of this page:

***“I do not go to the gym as frequently as I would like to”***


	Very Unrealistic						Very Realistic
How real is this scenario for you in terms of its possible occurrence?	1	2	3	4	5	6	7

Please make a **personal judgment** using each item listed below about the likely causes for the above occurrence. Circle the number to the right of the statement that best corresponds with how you feel about the statement:

	Very Unlikely cause						Very Likely cause
Because I am too old to exercise at a gym.	1	2	3	4	5	6	7
Because I do not have enough time to go to a gym.	1	2	3	4	5	6	7
Because I lack the ability to exercise at a gym.	1	2	3	4	5	6	7
Because I find the equipment at a gym too difficult to use.	1	2	3	4	5	6	7
Because I do not frequently attempt to be active at a gym.	1	2	3	4	5	6	7
Because I do not have the drive to exercise at the gym.	1	2	3	4	5	6	7
Because none of my family belongs to a gym or goes to a gym with me.	1	2	3	4	5	6	7

For the scenario presented at the top, please rank from 1 to 7 how important each of the possible causes is to you. Using each number only once, rank each item from 1 (**mostly likely cause**) to 7 (**least likely cause**).

- \_\_\_ Because I am too old to exercise at a gym.
- \_\_\_ Because I do not have enough time to go a gym.
- \_\_\_ Because I lack the ability to exercise at a gym.
- \_\_\_ Because I find the equipment at a gym too difficult to use.
- \_\_\_ Because I do not frequently attempt to be active at a gym.
- \_\_\_ Because I do not have the drive to exercise at the gym.
- \_\_\_ Because none of my family belongs to a gym or goes to a gym with me.

	<div style="border: 2px solid black; padding: 10px; display: inline-block;"> <h2 style="margin: 0;">Part 4</h2> </div>	
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Consider the following scenario when responding to all items on the remainder of this page:

***“For the most part, I am not involved with any sport clubs or teams.”***


	Very Unrealistic							Very Realistic
How real is this scenario for you in terms of its possible occurrence?	1	2	3	4	5	6	7	

Please make a **personal judgment** using each item listed below about the likely causes for the above occurrence. Circle the number to the right of the statement that best corresponds with how you feel about the statement:

	Very Unlikely cause							Very Likely cause
Because I do not put in the effort to become more involved in clubs or teams.	1	2	3	4	5	6	7	
Because I do not get a lot of support and encouragement to join a club or team from those close to me.	1	2	3	4	5	6	7	
Because I am not the type who has sporting ability.	1	2	3	4	5	6	7	
Because I do not consider these activities suitable at my age.	1	2	3	4	5	6	7	
Because sports are too hard to play.	1	2	3	4	5	6	7	
Because I lack the desire to become a member of a team or join a sports club.	1	2	3	4	5	6	7	
Because I do not have the time to fit these activities into my busy schedule.	1	2	3	4	5	6	7	

For the scenario presented at the top, please rank from 1 to 7 how important each of the possible causes is to you. Using each number only once, rank each item from 1 (**mostly likely cause**) to 7 (**least likely cause**).

- \_\_ Because I do not put in the effort to become more involved in clubs or teams.
- \_\_ Because I do not get a lot of support and encouragement to join a club or team from those close to me.
- \_\_ Because I am not the type who has the sporting ability.
- \_\_ Because I do not consider these activities suitable at my age.
- \_\_ Because sports are too hard to play.
- \_\_ Because I lack the desire to become a member of a team or join a sports club.
- \_\_ Because I do not have the time to fit these activities into my busy schedule.

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Consider the following scenario when responding to all items on the remainder of this page:

***“For the most part, I do not take part in the recommended levels of 30 to 60 minutes of moderate physical activity on most days put forth by the Canada’s physical activity guide”***


	Very Unrealistic						Very Realistic
How real is this scenario for you in terms of its possible occurrence?	1	2	3	4	5	6	7

Please make a **personal judgment** using each item listed below about the likely causes for the above occurrence. Circle the number to the right of the statement that best corresponds with how you feel about the statement:

	Very Unlikely cause						Very Likely cause
Because I cannot find the time to do enough physical activity to meet the recommended levels.	1	2	3	4	5	6	7
Because I lack the desire to be physically active.	1	2	3	4	5	6	7
Because those close to me do not engage in the recommended amounts of physical activity.	1	2	3	4	5	6	7
Because I am too old to be regularly physically active.	1	2	3	4	5	6	7
Because the recommended levels of moderate physical activity are too difficult for me to complete.	1	2	3	4	5	6	7
Because I do not put in the effort to meet these recommendations.	1	2	3	4	5	6	7
Because I lack the ability to be this active.	1	2	3	4	5	6	7

For the scenario presented at the top, please rank from 1 to 7 how important each of the possible causes is to you. Using each number only once, rank each item from 1 (**mostly likely cause**) to 7 (**least likely cause**).

- \_\_\_ Because I cannot find the time to do enough physical activity to meet the recommended levels.
- \_\_\_ Because I lack the desire to be physically active.
- \_\_\_ Because those close to me do not engage in the recommended amounts of physical activity.
- \_\_\_ Because I am too old to be regularly physically active.
- \_\_\_ Because the recommended levels of moderate physical activity are too difficult for me.
- \_\_\_ Because I do not put in the effort to meet these recommendations.
- \_\_\_ Because I lack the ability to be this active.

	<div style="border: 2px solid black; padding: 10px; display: inline-block;"> <h2 style="margin: 0;">Part 4</h2> </div>
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Consider the following scenario when responding to all items on the remainder of this page:

***“I often do not participate in physically active recreational or community programs (i.e., walking group, canoe club).”***


	Very Unrealistic						Very Realistic
How real is this scenario for you in terms of its possible occurrence?	1	2	3	4	5	6	7

Please make a **personal judgment** using each item listed below about the likely causes for the above occurrence. Circle the number to the right of the statement that best corresponds with how you feel about the statement:

	Very Unlikely cause						Very Likely cause
Because I lack the capability to participate in activities offered in these programs.	1	2	3	4	5	6	7
Because I feel too old to be active.	1	2	3	4	5	6	7
Because I often do not try to be active this way.	1	2	3	4	5	6	7
Because my family or friends are not involved with physical activity programs like these.	1	2	3	4	5	6	7
Because I am not interested in participating in the activities offered in these programs.	1	2	3	4	5	6	7
Because I do not have enough time in the day.	1	2	3	4	5	6	7
Because these programs require me to do activities that I find too difficult.	1	2	3	4	5	6	7

For the scenario presented at the top, please rank from 1 to 7 how important each of the possible causes is to you. Using each number only once, rank each item from 1 (**mostly likely cause**) to 7 (**least likely cause**).

- \_\_\_ Because I lack the capability to participate in activities offered in these programs.
- \_\_\_ Because I feel too old to be active.
- \_\_\_ Because I often do not try to be active this way.
- \_\_\_ Because my family or friends are not involved with physical activity programs like these.
- \_\_\_ Because I am not interested in participating in these activities offered in these programs.
- \_\_\_ Because I do not have enough time in the day.
- \_\_\_ Because these programs require me to do activities that I find too difficult.

 <p>uOttawa L'Université canadienne Canada's university</p>	<div style="border: 2px solid black; padding: 10px; display: inline-block;"> <h2 style="margin: 0;">Part 4</h2> </div>
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Consider the following scenario when responding to all items on the remainder of this page:

***“I rarely engage in physical fitness activities in or around my neighborhood (i.e., walking the dog, riding a bike, hiking along nature trails).”***

	Very Unrealistic							Very Realistic
How real is this scenario for you in terms of its possible occurrence?	1	2	3	4	5	6	7	

Please make a **personal judgment** using each item listed below about the likely causes for the above occurrence. Circle the number to the right of the statement that best corresponds with how you feel about the statement:

	Very Unlikely cause							Very Likely cause
Because I do not have the motivation to engage in physical fitness activities in and around my neighborhood.	1	2	3	4	5	6	7	
Because I do not have enough time for these activities.	1	2	3	4	5	6	7	
Because I do not have the ability to engage in fitness activities around my neighborhood.	1	2	3	4	5	6	7	
Because I do not try hard enough to do physical fitness activities around my neighborhood.	1	2	3	4	5	6	7	
Because I am feeling too old to do physical fitness activities around my neighborhood.	1	2	3	4	5	6	7	
Because I find it too hard to go outside and be active in and around my neighborhood.	1	2	3	4	5	6	7	
Because those close to me are not involved in fitness activities around my neighborhood.	1	2	3	4	5	6	7	

For the scenario presented at the top, please rank from 1 to 7 how important each of the possible causes is to you. Using each number only once, rank each item from 1 (**mostly likely cause**) to 7 (**least likely cause**).

- \_\_\_ Because I do not have the motivation to engage in physical fitness activities in and around my neighborhood.
- \_\_\_ Because I do not have enough time for these activities.
- \_\_\_ Because I do not have the ability to engage in fitness activities around my neighborhood.
- \_\_\_ Because I do not try hard enough to do physical fitness activities around my neighborhood.
- \_\_\_ Because I am feeling too old to do physical fitness activities around my neighborhood.
- \_\_\_ Because I find it too hard to go outside and be active in and around my neighborhood.
- \_\_\_ Because those close to me are not involved in fitness activities around my neighborhood.



**Part 4**

Consider the following scenario when responding to all items on the remainder of this page:

***“I rarely engage in unstructured or spontaneous physical activities and sports (i.e., pick-up basketball, shinny hockey).”***

	Very Unrealistic						Very Realistic
How real is this scenario for you in terms of its possible occurrence?	1	2	3	4	5	6	7

Please make a **personal judgment** using each item listed below about the likely causes for the above occurrence. Circle the number to the right of the statement that best corresponds with how you feel about the statement:

	Very Unlikely cause						Very Likely cause
Because at my age these unstructured or spontaneous activities are not for me.	1	2	3	4	5	6	7
Because I find these activities too challenging to do.	1	2	3	4	5	6	7
Because my schedule is too busy.	1	2	3	4	5	6	7
Because I do not have the ability to take part in unstructured activities and sports.	1	2	3	4	5	6	7
Because I am not motivated to engage in unstructured or spontaneous physical activities or sports.	1	2	3	4	5	6	7
Because I do not frequently try to be active this way.	1	2	3	4	5	6	7
Because people important to me are not interested in taking part in unstructured or spontaneous physical activities and sports.	1	2	3	4	5	6	7

For the scenario presented at the top, please rank from 1 to 7 how important each of the possible causes is to you. Using each number only once, rank each item from 1 (**most likely cause**) to 7 (**least likely cause**).

- Because at my age these unstructured or spontaneous activities are not for me.
- Because I find these activities too challenging to do.
- Because my schedule is too busy.
- Because I do not have the ability to take part in unstructured or spontaneous activities and sports.
- Because I am not motivated to engage in unstructured or spontaneous physical activities or sports.
- Because I do not frequently try to be active this way.
- Because people important to me are not interested in unstructured or spontaneous physical activities and sports.



**Part 4**

Consider the following scenario when responding to all items on the remainder of this page:

*“I typically do not walk, ride my bike, or use other physically active means to get from one place to another.”*

	Very Unrealistic						Very Realistic
How real is this scenario for you in terms of its possible occurrence?	1	2	3	4	5	6	7

Please make a **personal judgment** using each item listed below about the likely causes for the above occurrence. Circle the number to the right of the statement that best corresponds with how you feel about the statement:

	Very Unlikely cause						Very Likely cause
Because this way of transportation takes too much time.	1	2	3	4	5	6	7
Because I feel too old to travel actively.	1	2	3	4	5	6	7
Because getting around this way is too difficult.	1	2	3	4	5	6	7
Because I am not interested in traveling this way.	1	2	3	4	5	6	7
Because my family and friends do not travel this way.	1	2	3	4	5	6	7
Because I do not make an honest effort to travel this way.	1	2	3	4	5	6	7
Because I do not have the ability to actively travel from one place to another.	1	2	3	4	5	6	7

For the scenario presented above, please rank from 1 to 7 how important each of the possible causes is to you. Using each number only once, rank each item from 1 (**mostly likely cause**) to 7 (**least likely cause**).

- Because this way of transportation takes too much time.
- Because I feel too old to travel actively.
- Because getting around this way is too difficult.
- Because I am not interested in traveling this way.
- Because my family and friend do not travel this way.
- Because I do not make an honest effort to travel this way.
- Because I do not have the ability to actively travel from one place to another.



**Part 4**

Consider the following scenario when responding to all items on the remainder of this page:

***“For the most part, I do not participate in active chores in and around my house (i.e., gardening, mowing the lawn).”***

Very Unrealistic

Very Realistic

How real is this scenario for you in terms of its possible occurrence?	1	2	3	4	5	6	7
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Please make a **personal judgment** using each item listed below about the likely causes for the above occurrence. Circle the number to the right of the statement that best corresponds with how you feel about the statement:

Very Unlikely cause

Very Likely cause

Because my family does not partake in active household chores with me.	1	2	3	4	5	6	7
Because I lack the ability to actively complete household chores.	1	2	3	4	5	6	7
Because I do not exert the effort to complete household chores.	1	2	3	4	5	6	7
Because these tasks are too difficult for me to complete.	1	2	3	4	5	6	7
Because I feel too old to complete these active chores.	1	2	3	4	5	6	7
Because I do not feel like completing active chores around the house.	1	2	3	4	5	6	7
Because I do not have enough time to complete these chores in and around my house.	1	2	3	4	5	6	7

For the scenario presented above, please rank from 1 to 7 how important each of the possible causes is to you. Using each number only once, rank each item from 1 (**mostly likely cause**) to 7 (**least likely cause**).

- Because my family does not partake in active household chores with me.
- Because I lack the ability to actively complete household chores.
- Because I do not exert the effort to complete household chores.
- Because these task are too difficult for me complete.
- Because I feel too old to complete these active chores.
- Because I do not feel like completing active chores around the house.
- Because I do not have enough time to complete these chores in and around my house.

 <p>uOttawa L'Université canadienne Canada's university</p>		<b>Causal Dimension Scale for Aging</b>	
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Think about now your age may have been a reason for compromised physical activity on some of the prior scenarios. The items below concern your impressions or opinions on the effects of aging. Circle one number for each of the following scales.

1. I find the effects of age are:

<b>Reflected in aspects of myself</b>	9	8	7	6	5	4	3	2	1	<b>Dependent on the situation I am in</b>
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2. I find the effects of age are:

<b>Controllable</b>	9	8	7	6	5	4	3	2	1	<b>Uncontrollable</b>
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3. I find the effects of age to be:

<b>Permanent</b>	9	8	7	6	5	4	3	2	1	<b>Temporary</b>
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4. I find aging to be:

<b>A reason that can intentionally be used to explain life's successes or failures</b>	9	8	7	6	5	4	3	2	1	<b>A reason that can unintentionally be used to explain life's successes or failures</b>
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5. Aging is something that is:

<b>Outside of me</b>	9	8	7	6	5	4	3	2	1	<b>Inside of me</b>
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6. Aging is something that is:

<b>Variable over time</b>	9	8	7	6	5	4	3	2	1	<b>Stable over time</b>
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7. I find that the effects of age represent:

<b>Something about me</b>	9	8	7	6	5	4	3	2	1	<b>Something about others</b>
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8. Aging is something that is:

<b>Changeable</b>	9	8	7	6	5	4	3	2	1	<b>Unchanging</b>
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9. I find the effects of age:

<b>My responsibility</b>	9	8	7	6	5	4	3	2	1	<b>Others' responsibility</b>
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Université d'Ottawa University of Ottawa  
 Bureau d'éthique et d'intégrité de la recherche Office of Research Ethics and Integrity

**Ethics Approval Notice**  
**Health Sciences and Science REB**

**Principal Investigator / Supervisor / Co-investigator(s) / Student(s)**

<u>First Name</u>	<u>Last Name</u>	<u>Affiliation</u>	<u>Role</u>
Bradley	Young	Health Sciences / Physiotherapy	Principal Investigator

File Number: h06-10-18

Type of Project: Professor

Title: Aging Expectations and Age Attributions for Physical Inactivity among Middle-aged Older Adults

<u>Approval Date (mm/dd/yyyy)</u>	<u>Expiry Date (mm/dd/yyyy)</u>	<u>Approval Type</u>
08/18/2010	08/17/2011	Ia

(Ia: Approval, Ib: Approval for initial stage only)

**Special Conditions / Comments:**

This certificate is valid for conducting research only with the 2010 Canada 55<sup>th</sup> Games Organizing Committee, Wild for Walking, Orleans Bowling, and Stouffville District Secondary School.



Université d'Ottawa      University of Ottawa  
Bureau d'éthique et d'intégrité de la recherche      Office of Research Ethics and Integrity

This is to confirm that the University of Ottawa Research Ethics Board identified above, which operates in accordance with the Tri-Council Policy Statement and other applicable laws and regulations in Ontario, has examined and approved the application for ethical approval for the above named research project as of the Ethics Approval Date indicated for the period above and subject to the conditions listed the section above entitled "Special Conditions / Comments".

During the course of the study the protocol may not be modified without prior written approval from the REB except when necessary to remove subjects from immediate endangerment or when the modification(s) pertain to only administrative or logistical components of the study (e.g. change of telephone number). Investigators must also promptly alert the REB of any changes which increase the risk to participant(s), any changes which considerably affect the conduct of the project, all unanticipated and harmful events that occur, and new information that may negatively affect the conduct of the project and safety of the participant(s). Modifications to the project, information/consent documentation, and/or recruitment documentation, should be submitted to this office for approval using the "Modification to research project" form available at:  
[http://www.rges.uottawa.ca/ethics/application\\_dwn.asp](http://www.rges.uottawa.ca/ethics/application_dwn.asp)

Please submit an annual status report to the Protocol Officer 4 weeks before the above-referenced expiry date to either close the file or request a renewal of ethics approval. This document can be found at:  
[http://www.rges.uottawa.ca/ethics/application\\_dwn.asp](http://www.rges.uottawa.ca/ethics/application_dwn.asp)

Germain Zongo  
Protocol Officer for Ethics in Research  
For Dr. Daniel Lagarec, Chair of the Health Sciences and Sciences REB