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A Longitudinal Study Of The Negative Impact Of Falls On Health, Well-Being, And Survival Among Older Adults: An Examination Of Protective Psychosocial Mediators

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A LONGITUDINAL STUDY OF THE NEGATIVE IMPACT OF FALLS ON HEALTH, WELL-BEING, AND SURVIVAL AMONG OLDER ADULTS: AN EXAMINATION OF PROTECTIVE PSYCHOSOCIAL MEDIATORS

by

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Harpa Lind Jónsdóttir
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ABSTRACT

Falls can have detrimental effects on older adults' physical and psychological health, and survival rates. However, there appears to be a protective psychosocial mediator that may lessen the negative impact of experiencing a fall on health and well-being. The psychosocial factors examined as mediators of the falls - health and well-being relationship in this study were dispositional optimism and perceived control. Participants were 232 community-dwelling older adults, age 68 or older. This study was linked to a longitudinal study including data collected in 2008 and 2010 (Grand Cities Healthy Aging Study (GCHAS). Measurements of dispositional optimism, perceived control, self-rated physical health, health-care utilization, number of falls, symptoms of depression, perceived stress and physical activity were examined. Survival was also tracked. Older adults who suffered a fall had poorer health and well-being cross-sectionally and at the two-year follow-up than those who did not suffer a fall. Perceived control mediated the negative impact of falls on certain current and subsequent health and well-being variables up to two years later. Among older adults who experienced a fall, higher levels of perceived control predicted better cross-sectional and subsequent health and well-being. Falls also predicted less likelihood of survival seven years later, with covariates accounted for. These findings have clinical implications.

CHAPTER I

INTRODUCTION

Suffering a fall can be detrimental to the health and psychological well-being of older adults. It is important to examine psychosocial mediators to better understand the mechanisms underlying the connection between falls and health and wellbeing outcomes and to facilitate post-fall recovery. Two psychosocial factors that have been found to mediate the negative effects of falling on health and well-being are perceived control and dispositional optimism (Ruthig, Chipperfield, Newall, Perry, & Hall, 2007). The current longitudinal study will extend this line of research by examining the mediating roles of perceived control and optimism in the falls - health and wellbeing relationship among a large community sample of older adults over a six-year period. The details of the current study follow a review of the relevant literature on falls among older adults and a discussion of the psychosocial constructs of perceived control and dispositional optimism.

Falls in Later Life

The risk of falling increases with age, and it is estimated that about one third of community-living adults, aged 65 and older, suffers a fall each year (Ambrose, Paul, & Hausdorff, 2013; Gleeson, Sherrington, & Keay, 2014; Hadjistavropoulos et al., 2012; Noohu, Dey, & Hussain, 2014). Frequency of falling also increases as people age (Lord, Sherrington, Menz, and Close, 2007; Rubenstein, 2006) and those who have fallen in the

last 12 months tend to believe they are more likely to suffer additional falls. For example, in a study on Australian community-living adults age 65 years and older, those who had fallen in the previous year perceived their chances of falling again in the future as higher compared to others (Dollard, Barton, Newbury, & Turnbull, 2013). Likewise, those who had fallen within the past three months believed that they were at higher risk of falling again, compared to others who fell four or more months ago (Dollard et al., 2013). Although about one third of older adults falls each year (Gill, Taylor, & Pengelly, 2005), most (88%) older adults recognized that falling could have serious consequences for their health (Hahn, van Beurden, Kempton, Sladden, & Garner, 1996; Horne, Skelton, Speed, & Todd, 2014).

Falls can detrimentally affect older adults' physical health, level of independence, psychological well-being, and overall quality of life. In terms of physical health, serious falls may lead to fractures, and it becomes more difficult to recover from fall-related injuries with advanced age (Kempen et al., 2003; Salva, Bolibar, Pera, & Arias, 2004). Studies also suggest that up to 31% of falls among older adults lead to injuries and persistent impairments (Hadjistavropoulos et al., 2012). Falls also contribute to greater risk of mortality, likely due to the fall-related injuries (Rubenstein, 2006). Hip fractures appear to be a leading contributor to fall-related deaths among older adults (Deprey, 2009; Farahmand, Michaelsson, Ahlbom, Ljunghall, & Baron, 2005). It is estimated that two-thirds of unintentional injuries, which can lead to death, are due to falls among older adults (Rubenstein, 2006). Falls can also decrease independence which may in turn increase the mortality rates (Centers for Disease Control and Prevention, 2013).

In addition to potential physical harm, falls can diminish older adults' level of independence, as some individuals may need to be institutionalized or may become heavily dependent upon health services after suffering a fall (Ruthig et al., 2007). Many older adults who fall may have a decrease sense of autonomy if they are not able to engage in the same activities as they did before falling (Yardley & Smith, 2002). Similarly, falls can negatively affect older adults' subsequent psychological well-being and quality of life (Knowlton, 2001; Tiernan, Cathy, Neufeld, Goldberg, & Lichtenberg, 2014). Some older adults who fall have also experienced declines in functional ability (Ruthig et al., 2007). In sum, falling can be a significant life-changing event, in terms of altering one's physical health, level of independence, functional ability, psychological well-being, and overall quality of life.

Given the potential negative impacts on physical health, functional ability, psychological well-being, and quality of life resulting from a fall, it is no surprise that up to 86% of older community-living adults have a fear of falling. A review of 21 studies showed that this fear of falling appears to be equally common among those both with and without a history of falling (Filiatrault & Desrosiers, 2011). Moreover, in the absence of suffering an actual fall, fear of falling can affect older adults' independence, as well as their physical and psychological health. Some individuals may avoid certain activities, or limit their frequency of engaging in them, which can, in turn, have negative effects on the older adults' health and mobility, and lead to decline in physical and functional skills. This decline, in addition to lower activity levels, can actually increase the risk of falling (Filiatrault & Desrosiers, 2011; Mhaolain et al., 2012; Vellas, Wayne, Romero,

Baumgartner, & Garry, 1997). In fact, fear of falling has been found to predict the risk of falling among older adults (Scheffer, Schuurmans, Van Dijk, & Van Der Hoof, 2008). For example, a study of older adults suggested that fear of falling and anxiety can decrease balance, which can in turn affect the risk of falling (Hadjistavropoulos et al., 2012). This suggests there are some intrinsic factors, such as indicators of one's own capabilities, which may affect older adults' risk of falling.

Perceived Control among Older Adults

Aside from fear or anxiety as intrinsic factors that relate to falling, a psychosocial construct that has been found to mediate the link between falls and subsequent health and well-being is perceived control (Ruthig et al., 2007). Perceived control has been defined as a perceived influence over environmental events and outcomes (Heckhausen & Baltes, 1991; Heckhausen & Schulz, 1995; Rothbaum, Weisz, & Snyder, 1982; Skinner, 1995; Wrosch & Heckhausen, 2002), and the belief that one can obtain a desired outcome and avoid undesired outcomes (Ferguson & Goodwin, 2010). For example, older adults who believe that they can exert direct control (in terms of what they say and what they do) over their daily tasks, leisure activities, and their health would reflect high perceived control. Conversely, those older adults who believe that they cannot directly influence their daily tasks, leisure activities, or health, no matter what they say or do, would reflect low or a lack of perceived control.

It may become increasingly difficult for older adults to control events or directly influence outcomes in their environment, and therefore, their levels of perceived control may be lower than their younger counterparts (Chipperfield et al., 2012). Many factors

may contribute to a decline in perceived control among older adults, such as suffering a significant loss (e.g., death of a loved one), experiencing a major life change (e.g., retirement), or age-related changes (e.g., decline in motor skills). Nonetheless, many community-living older adults continue to maintain a high level of perceived control, a critical factor in successful aging (Chipperfield, et al., 2012).

Ample research has shown perceived control to be beneficial to older adults' psychological well-being and physical health. A study of older adults suggested that control over one's life events was linked to subjective well-being (Lang & Heckhausen, 2001). Other studies including older adults have reported the same results (Infurna, Gerstorf, Ram, Schupp, & Wagner, 2011; Kunzmann, Little, & Smith, 2002). In terms of psychological well-being, greater perceived control among older adults has been linked to psychological resilience (Baltes, Staudinger, & Lindenberger, 1999), fewer negative emotions (Infurna & Gerstorf, 2014; Ruthig et al., 2007), and fewer symptoms of depression (Infurna, Ram, & Gerstorf, 2013). In other words, perceived control is likely to buffer negative effects of stressful events on psychological health, and it may provide people with the resources needed to decrease negative emotional experiences, which in turn affects physical health (Infurna et al., 2011). Perceived control has also been linked to greater life satisfaction over a six-month period (Infurna et al., 2013; Lang & Heckhausen, 2001), greater engagement in social activities (Infurna et al., 2011), and more frequent positive emotions (Lang & Heckhausen, 2001).

In addition to the psychological benefits, perceived control also contributes to better physical health in terms of functional ability and physiological health (Infurna &

Gerstorf, 2014). In particular, high perceived control is linked to more efficient neuroendocrine functioning and better cardio-metabolic health (Infurna & Gerstorf, 2014). Greater perceived control is also associated with less reliance on formal health care services, including fewer physician visits and fewer hospital admissions (Arbuckle, Pushkar, Chaikelson, & Andres, 1999; Chipperfield, et al., 2012).

In addition, older adults with higher levels of perceived control tend to be more active, engage in more health enhancing behaviors, such as exercising, running, walking, vacuuming, or maintain a healthy diet, and have better survival and longevity rates (Chipperfield et al., 2012; Infurna & Gerstorf, 2014; Ruthig, Trisko, & Chipperfield, 2014). In fact, perceived control has been found to predict 12-year survival rates among community dwelling older adults (Chipperfield, et al., 2012). Higher levels of perceived control may also be a protective factor. It has, for example, been suggested to protect against the risk of having cardio-metabolic issues, which may in turn affect mortality rates (Chipperfield et al., 2012; Infurna & Gerstorf, 2014).

Overall, perceived control among older adults has been found to benefit physical health, psychological well-being, and even survival over several years. As described in more detail later, perceived control may also serve as a protective factor in terms of diminishing the negative effects of suffering a fall in later life. Before detailing this protective mediating role of perceived control, a second psychosocial factor, namely dispositional optimism and its beneficial role in later life is subsequently discussed.

Dispositional Optimism in Later Life

Dispositional optimism, refers to positive expectations about future outcomes and events (Benyamini & Roziner, 2008; Ferguson & Goodwin, 2010). Essentially, optimistic individuals see the world through “rose colored glasses” and have a consistent “glass half full” mentality, believing that good things are more likely to happen to them than are bad things (Scheier & Carver, 1985).

Dispositional optimism has been shown to predict subjective well-being among older adults (Ju, Shin, Kim, Hyun, & Park, 2013; Minton, Hertzog, Barron, French, & Reiter-Palmin, 2009; Rius-Ottenheim et al., 2012; Ruthig et al., 2007) during stressful times (Benyamini & Roziner, 2008; Ferguson & Goodwin, 2010). In particular, optimistic older adults enjoy greater life satisfaction and are generally happier in their life compared to others (Sharpe, Martin, & Roth, 2011). They also enjoy more positive affect and experience less negative affect compared to their less optimistic counterparts (Ju et al., 2013; Ferguson & Goodwin, 2010).

Moreover, optimism appears to be protective for older adults’ psychological well-being. In particular, it has been linked to lower levels of depression, anxiety, and stress in later adulthood (Ju et al., 2013; Minton et al., 2009). In addition, a study on older men between the ages of 70-89 showed that those who were more optimistic were less likely to feel lonely, regardless of depression or any changes that may have occurred in their social relationships. Likewise, other studies have reported a link between optimism and lower levels of loneliness among older women (Barron, Foxall, von Dollen, Shull, & Jones, 1992). Suggested mechanisms of optimism may include that optimists are more

likely than others to view their social relationships in a more positive way than others, or they may more actively try to create new social connections in tough situations (Rius-Ottenheim et al., 2012).

Aside from psychological benefits, optimism has been linked to lower mortality rates, perhaps due to enhanced immunity, fewer stressors in the environment, and more effective coping in stressful situations (Baldwin, Jackson, Okoh, & Cannon, 2011; Ju et al., 2013). Optimists appear to be more likely than others to have good physical health (Benyamini & Roziner, 2008; Ruthig et al., 2007; Sharpe et al., 2011), higher self-rated health (Steptoe, Wright, Kunz-Ebrecht, & Iliffe, 2006), and recover from illness and injury more quickly than others (Baldwin et al., 2011). A study reported that optimists were five times less likely than others to rate their health as poor or fair (Steptoe et al., 2006). Other research on older adults found that optimism was linked to brisk walking, vigorous physical exercise, and more frequent physical activity (Ruthig et al., 2007; Steptoe et al., 2006), regardless of sociodemographic factors. Moreover, optimists are less likely to smoke and more likely to moderate their alcohol consumption compared to their less optimistic counterparts (Steptoe et al., 2006). Together, these studies demonstrate the health related benefits of dispositional optimism among older adults.

Optimism may be particularly valuable during stressful times. Research by Scheier and colleagues suggested that dispositional optimism increases problem-focused coping and problem-focused strategies, information seeking, and positive reframing (Scheier, Carver, & Bridges, 2001). This coping mechanism then decreases denial during difficult times, and makes it easier to handle stressful events (Ju et al., 2013; Rius-

Ottenheim et al., 2012). Problem-focused coping reduces stress and in turn, increases physical and mental well-being. Optimism may thus make people more likely to engage in adaptive behaviors, and to process information and use problem-solving skills more effectively than others. Those who engage in these aforementioned behaviors are in turn more likely than others to make choices that are healthy (Steptoe et al., 2006).

A study of African American older adults found that those who had higher levels of optimism had more resiliency and were in less distress than others (Baldwin et al., 2011). A study including 1071 older adults in stressful situations or experiencing stressful events suggested that optimism was linked to fewer symptoms of depression (Grimes, 2001). A study on older widowed adults indicated that optimism was linked to psychological well-being (Fry, 2001). Older adults with a cardiovascular disease, another stressful experience, who were optimistic about their future were less likely than others to be readmitted to the hospital for issues relevant to their disease (Middleton & Byrd, 1996). Optimism thus appears to be a protective factor in difficult or stressful situations.

Falls, Perceived Control, and Optimism

Clearly, prior research has established that suffering a fall can negatively impact older adults' health and well-being, whereas perceived control and dispositional optimism are beneficial to health and well-being in later adulthood. A cross-sectional study examining the effects of falling on physical health, functional health, and psychological well-being found that old-old adults (age 85 and older) living within the community who fell within the past year had poorer physical health and were less physically active compared to non-fallers (Ruthig et al., 2007). Notably, the study also

showed that suffering a fall predicted lower levels of perceived control and dispositional optimism which were positively associated with health and well-being outcomes. That is, perceived control and optimism were found to mediate the effects of falling on very old adults' physical health, functional ability, and psychological well-being. These findings suggest that older adults, who have higher initial levels of perceived control and dispositional optimism, may suffer fewer negative consequences if they experience a fall (Ruthig et al., 2007).

Other relevant research has shown that older adults with high levels of perceived control engaged in more physical activity and that physical activity was linked to fewer subsequent falls (Kosma, 2014). High perceived control over one's behavior has also been linked to an increase in participation in falls prevention programs for older adults, which decreases their chance of actually falling (Nyman, 2011).

Like perceived control, dispositional optimism has also been found to serve a protective role for fallers. In particular, a study of 100 older community-living women who had suffered hip fractures (resulting from a fall) suggested that post-fracture optimism was linked to greater engagement in daily activities, approximating pre-fracture abilities to engage in these activities (Roberto, 1992). Likewise, optimism has likewise been linked to less pain catastrophizing (Wells, 2014) and to less overall body pain (Achat, Kawachi, Spiro, DeMolles, & Sparrow, 2000).

The Current Study

The current longitudinal study examined perceived control and dispositional optimism as mediators in the relationship between falls and subsequent physical health,

psychological well-being, and survival. Follow-up of community-living older adults, who took part in the Grand Cities Health Aging Study in 2008, and again in 2010, enabled examination of the negative impact of falling on health, well-being, and survival over a seven-year period. This design also allowed for examining the mediating roles of perceived control and optimism in the link between falls and health and well-being outcomes. Examining these relationships has implications for understanding malleable psychosocial factors that protect against falling and for devising interventions to aid in recovery after a fall. Findings from this research could contribute to enhancing the length and quality of life among older adults. As subsequently described, this study expanded prior research on the falls-health/well-being link in several ways.

Prior cross-sectional research on old-old adults (85+) has also shown that falls negatively predict general physical health, recent physical health, and physical activity, but that perceived control and optimism mediate the negative effects of falls on these health and well-being outcomes (Ruthig et al. 2007). The current study examined whether these findings replicate cross-sectionally among a broader sample of older adults (ages 60+) and among a broader set of outcomes, including depression, perceived stress, and health care utilization (i.e., frequency of dr. visits and hospital admissions).

Hypothesis 1a: It is expected that falls reported in 2008 will predict poorer health (i.e., current physical health, physical activity, illness-related physician visits, hospital admissions) and poorer psychological well-being (depressive symptomology, perceived stress) in 2008.

Hypothesis 1b: It is expected that perceived control and dispositional optimism in 2008 will mediate the cross-sectional links between falls reported in 2008 and health and well-being in 2008 such that falls will negatively predict perceived control and optimism, which in turn will predict better health and well-being.

Beyond attempting to replicate prior findings (Ruthig et al., 2007) among a broader sample of older adults using additional measures of health and well-being, the current study also explored the extent to which perceived control and optimism mediate the impact of falling on health and well-being outcomes longitudinally. That is, falls in 2008 were examined as predictors of health and well-being outcomes in 2010. In addition, the mediating roles of perceived control and optimism in 2008 in the initial falls (2008) on health and well-being outcomes in 2010 were examined.

Hypothesis 2a: Falls reported in 2008 are expected to predict poorer subsequent health (i.e., current physical health, physical activity, illness-related physician visits, and hospital admissions) and poorer subsequent psychological well-being (depressive symptomology, perceived stress) in 2010.

Hypothesis 2b: It is expected that perceived control and dispositional optimism will mediate the longitudinal links between falls and health and well-being such that falls reported in 2008 will negatively predict perceived control and optimism in 2008, which in turn will predict better subsequent health and well-being in 2010.

Additional data collection in 2014-2015 will enable examination of the longer-term impact of falling and the mediational effects of perceived control and optimism on health and well-being, as well as survival over a seven-year period.

Hypothesis 3a: Falls reported in 2008 are expected to predict poorer subsequent health (i.e., current physical health, physical activity, illness-related physician visits, hospital admissions) and poorer subsequent psychological well-being (depressive symptomology, perceived stress) in 2014-2015.

Hypothesis 3b: It is expected that perceived control and dispositional optimism will mediate the longitudinal links between falls and health and well-being such that falls reported in 2008 will negatively predict perceived control and optimism in 2010, which in turn will predict better subsequent health and well-being in 2014-2015.

Hypothesis 3c: Given that falls are associated with greater risk of mortality (CDC, 2013; Rubenstein, 2006), it is expected that falling in 2008 will negatively predict the likelihood of survival in 2014-2015.

Hypothesis 3d: Based on past findings that perceived control and optimism are associated with greater survival (Chipperfield et al., 2012) it is predicted that perceived control and optimism in 2010 will mediate the relationship between falls in 2008 and survival in 2014-2015.

Though no formal hypotheses were generated, the relationship between perceived control and optimism in 2008 with subsequent falls in 2010 and 2014/15 (and between perceived control and optimism in 2010 with subsequent falls in 2014/15) was also examined to identify whether higher levels of earlier perceived control and optimism are associated with lower risk of subsequent falls.

CHAPTER II

METHOD

The current study consisted of collecting follow-up data from older adults who previously participated in the Grand Cities Healthy Aging Study (GCHAS) in 2008 and again in 2010. A description of the original GCHAS is subsequently described, followed by a description of the follow-up subsample and recruiting methods.

Participants and Procedure

Participants in the 2008 GCHAS were 489 older adults, age 60+living within a 60 mile radius of Grand Forks/East Grand Forks. The participants were recruited in one of the following ways: a) from a list of UND alumni and their spouses who had received an undergraduate degree in or prior to 1967 and live within 60 miles of Grand Forks; or b) from a list of participants who had participated in other aging studies within the psychology department at UND. Study eligibility required a level of cognitive functioning necessary to complete the majority of the interview without help and was determined by the interviewer. Participants were recruited via telephone and the majority (n = 400; 82%) completed an individual in-person interview about various health, well-being, and sociodemographic factors. The remaining 89 (18%) participants completed an identical mail-in survey. The participants received monetary compensation for their participation. The majority of the participants were female (55.6%) and their mean age was 70.03 (SD = 7.78).

In 2010, 431 (88%) of the original GCHAS participants took part in the second wave of the study and completed many of the same measures as in 2008. Since 2008, 11 participants were deceased, 4 could not be reached, and 43 participants declined participation due to various reasons (e.g., too ill, too busy, not interested, etc.). Of the 431 participants in 2010, the majority (n = 339, 79%) completed an in-person interview and the remaining 92 participants completed identical mail-in surveys. No differences were found between participants who completed the interview in-person versus the mail-in survey (Ruthig et al., 2014). The participants received monetary compensation for their participation. Again, the majority of the participants were female (55.6%) and their mean age was 72.00 (SD = 7.74).

For the third wave of the study, an initial search of obituary announcements was used to determine survival/mortality of former GCHAS participants. Surviving participants were contacted by telephone and invited to participate in the follow-up component of the study. Participants were 232 older adults who completed the follow-up component of the study. The follow-up survey included measures of physical and psychological health, well-being, perceived control, optimism, and physical activity. The survey took participants approximately 15-20 minutes to complete and participants were automatically entered in a lottery for sixteen $50 Target gift cards.

Measures

Dispositional optimism and perceived control. The following measures of dispositional optimism and perceived control were assessed in both of the 2008 and 2010

waves of the GCHAS and were reassessed in the follow-up component of the current study in 2014/2015.

The 8-item Life Orientation Test – Revised (LOT-R) scale (Scheier, Carver, & Bridges, 1994) was used to assess participants' dispositional optimism on a 6-point Likert scale ranging from 1 (*Strongly disagree*) to 6 (*Strongly agree*). A sample item is "I hardly ever expect things to go my way". Reliability of the LOT-R among older adults is good, α = .81 (Ruthig, Hanson, Pedersen, Weber, & Chipperfield, 2011), and the reported 4-months test-retest reliability = .68, and 28-months test-retest reliability = .79 (Scheier et al., 1994).

Similar to past healthy aging research (Ruthig, Chipperfield, Bailis, & Perry, 2008; Ruthig et al., 2014), participants were asked: "To what extent do you feel you can personally influence things by what you do or say?" and then asked to indicate how much influence they believe they have on a ten-point Likert Scale from 1-10 (1 = *Almost no influence*; 10 = *Total influence*) on 5 domains. The domains are 1) your physical health, 2) your thoughts and feelings, 3) the things you can do for fun and enjoyment, 4) managing the usual tasks that need to be done, and 5) your life in general (Chipperfield, Campbell, & Perry, 2004). Reliability has been reported to be good: α = .86-.87 (Ruthig et al., 2014).

Physical health and falls measures. Each of the following physical health measures of general health, health care utilization, physical activity and falls were assessed in the 2008 and 2010 waves of the GCHAS and were reassessed in the follow-up component of the current study in 2014/2015.

General self-rated health was measured with a single-item measure asking participants to rate their health in general for their age on a five-point Likert scale ranging from 1 (*Excellent*) to 5 (*Bad*). This measure is reverse coded so that higher scores reflect better health as perceived by the participants. This measure has been used in previous studies and has been established as a valid and reliable measure (Benyamini, Idler, Leventhal, & Leventhal, 2000; Chipperfield et al., 2012; Idler & Benyamini, 1997).

Participants were asked how many illness-related visits they had had to the doctor's office, how many times they had been admitted to the hospital in the past year, and how many days they had to stay at the hospital in the past year.

Participants were asked to rate their physical activity for the past few months on a seven-point Likert scale ranging from 1 (Extremely Inactive) to 7 (Extremely active).

Participants were asked to indicate how many times they experienced a fall within the past year. As in prior research (Ruthig et al., 2007), responses to this item were dichotomized in order to assess the impact of falling by comparing non-fallers to fallers.

Psychological well-being. Each of the following psychological well-being measures of depressive symptomology and perceived stress were assessed in the 2008 and 2010 waves of the GCHAS and were reassessed in the follow-up component of the current study.

The Center for Epidemiologic Studies Depression Scale-Short (CESD-10) assesses participants' depressive symptomology (Andresen, Malmgren, Carter, & Patrick, 1994). This scale consists of ten items on a four-point Likert scale ranging from 0 (rarely or none of the time, <1 a day) to 3 (most or all of the time, 5-7 days) and assesses

depressive feelings and behaviors, such as feelings of hopelessness, fearfulness, and low motivation that participants had experienced in the past week. Participants are asked to rate themselves on questions such as “I felt depressed” and “I could not get going”. In a study on older adults, predictive validity was reported to be good when compared to the original 20-item CESD (*kappa* = .97). Internal reliability has been reported to be adequate in the GCHAS in 2008 and 2010, $\alpha = .79$ and $\alpha = .82$ respectively. Test-retest reliability has also been reported to be adequate ($r = .71$) in other studies (Andresen et al., 1994).

The seven item Perceived Stress Scale (PSS, Cohen, Kamarck, & Mermelstein, 1983) was used to measure perception of stress in the last month. Participants are asked to indicate how often they felt in a certain way on a five-point Likert scale ranging from 1 (Never) to 5 (Very often). A sample item is: “How often have you felt nervous and 'stressed'?” Internal reliability is good, $\alpha = .84$-$.86$ (Cohen, 1986; Cohen et al, 1983).

Survival. Participants’ survival since 2008 was tracked as part of the follow-up study. Survival was verified by speaking to the participant when determining whether he or she is willing to participate in the follow-up study. An obituary search was initiated for participants that could not be reached and mortality was tracked and verified in terms of matching date of birth. Survival in the current analyses was recorded as a dichotomous outcome measure.

Sociodemographics. In the follow-up study, participants were asked to indicate their height in feet and inches, weight in pounds, their total household income before

deductions in the past year, and their current marital status: single/never married, married/cohabitating, widowed, or divorced/separated.

The following sociodemographic information collected during the 2008 GCHAS was also be included in the study: age (based on date of birth), gender, education level (years of school completed), average yearly household income, marital status, and chronic conditions indicated in 2008.

CHAPTER III

RESULTS

Preliminary Analyses

Prior to testing the main hypotheses, descriptive statistics were examined for all study variables. As shown in Table 1, in 2008 and 2010, 57% of the participants were women and most identified as Caucasian. In 2008, participants' average age was 70.37 years (*SD* = 7.99). In 2010, participants' average age was 71.91 years (*SD* = 7.67). In both years, the majority of participants were married or cohabitating, had completed at least a bachelor's degree, and had a household income of $40,000 and above. In 2008, the majority lived with only one other individual.

As shown in Table 2, in 2008 and 2010, participants' average rating for their general health was very good. Participants had an average of five physician visits, and typically were not admitted to the hospital within the past year. For those admitted to the hospital within the past year, their average stay was five days in 2008, and nearly eight days in 2010. The majority (70%) did not suffer a fall within the previous year. Paired samples t-tests were conducted to examine mean differences in variables from 2008 to 2010. As indicated in Table 2, there was a significant decline in participants' self-rated general health and physical activity, and they suffered more falls in 2010 compared to 2008.

As Table 3 shows, participants were, on average, highly optimistic and had high levels of perceived control in both 2008 and 2010. Levels of stress were moderate, and participants reported relatively low levels of depressive symptomology. When comparing psychosocial factors in 2008 and 2010, participants reported a significant increase in depressive symptomology, but a significant decrease in stress and optimism. There was no significant change in levels of perceived control from 2008 to 2010, see Table 3.

Bivariate correlations were computed among the variables measured in 2008, as shown in Table 4. In 2008, being older was associated with less physical activity, lower perceived control, and more physician visits, hospitalizations, and depression. Greater education was associated with better general health, more perceived control, fewer falls, and less depression and stress. Compared to men, women reported less physical activity and optimism, but more falls, and stress. Having a committed relationship (married/cohabitating) was associated with better general health, more physical activity and perceived control, fewer falls, and less depression and stress. Given their significant associations with several of the health variables, age, gender, education, and marital status (married/cohabitating vs. not married or cohabitating) were included as covariates in the main analyses.

Among the health variables, better general health was associated with more physical activity, which were both associated with fewer physician visits, hospital admissions, and falls, less depression and stress, and more optimism and perceived control. More physician visits were associated with more hospital admissions. More falls were associated with more physician visits and hospitalization, depression and stress, and

less perceived control. Optimism and perceived control were associated with less depression and stress (see Table 4).

Bivariate correlations among all variables in 2010 are shown in Table 5. In 2010, being older was associated with poorer general health, less physical activity, perceived control and optimism, and more hospitalizations, falls, and depression. Greater education was associated with better general health, more optimism, and less depression and stress. Women reported more hospital admissions, falls, and stress than men. Married individuals reported better general health, more physical activity, optimism and perceived control, less depression, and fewer physician visits. Better general health was associated with more physical activity. Both better general health and more physical activity were associated with fewer physician visits, hospital admissions and falls, and less depression and stress, and more optimism and perceived control. More physician visits were associated with more hospital admissions. More falls were associated with more hospitalization, depression and stress, and less perceived control. Perceived control was associated with less frequent hospital admissions. Optimism and perceived control were associated with less depression and stress. See Table 5.

Impact of Falling on Health and Well-being in 2008

According to Hypothesis 1a, it was expected that experiencing a fall in 2008 would predict poorer health (i.e., general health, physical activity, illness-related physician visits, and hospital admissions) and poorer well-being (depressive symptomology, perceived stress) in 2008. According to Hypothesis 1b, it was also expected that perceived control and dispositional optimism in 2008 would mediate the

cross-sectional links between falls reported in 2008 and health and well-being in 2008 such that falls would negatively predict perceived control and optimism, which in turn will predict better health and well-being.

To test these hypotheses, separate regression analyses were first conducted to examine the effects of falling within the past year on perceived control and optimism, with the dichotomous falls measure (falls vs. no falls) as a predictor, along with age, gender, marital status (married or cohabitating/not married or cohabitating), and education as covariates. A separate series of hierarchical regression analyses were then conducted to examine the effect of falling on general health, physical activity, physician visits, hospital admission, depression, and stress, with falling and the demographic covariates above, entered in Step 1 of the model, and optimism and perceived control added as predictors in Step 2.

Impact of falling on perceived control and optimism. Results showed that the overall models were significant for perceived control, $F(5, 484) = 15.28$, $p < .001$, and for optimism, $F(5, 486) = 4.42$, $p < .001$. As evident in Table 6, being older ($\beta = -.201$, $p < .001$), unmarried/not cohabitating ($\beta = -.151$, $p < .001$), and falling ($\beta = -.205$, $p < .001$) predicted lower levels of perceived control. Being a woman ($\beta = .153$, $p < .01$) and in a committed relationship ($\beta = -.165$, $p < .001$) predicted more optimism. Falls ($\beta = -.044$ $p > .05$) did not significantly predict optimism.

Impact of falling on health. Hierarchical regression results showed the overall model including falls, age, gender, marital status, and education as predictors entered in Step 1, and optimism and perceived control entered in Step 2 was significant for general

health, $F(7, 475) = 16.32$, $p < .001$. As evident in Step 1 in Table 7, experiencing a fall and not having a committed relationship predicted poorer general health ($\beta = -.167$ and $\beta = -.170$, $p < .001$, respectively), and education predicted better general health ($\beta = .140$, $p < .01$). In Step 2, education, perceived control and optimism predicted better general health ($\beta = .126$, $p < .01$, $\beta = .295$, $p < .001$, and $\beta = .198$, $p < .05$, respectively). The addition of perceived control and optimism in Step 2 resulted in an increment in R^2 (R^2 change = .103, $p < .001$). The effect of falls was reduced from Step 1 ($\beta = -.167$, $p < .001$) to Step 2 ($\beta = -.117$, $p < .01$), suggesting the effect of falls was partially mediated by perceived control.

The model was significant for physical activity, $F(7, 475) = 19.41$, $p < .001$. As evident in Table 7, being older, not having a committed relationship, and experiencing a fall predicted less physical activity ($\beta = -.117$, $p < .01$, $\beta = -.218$, $p < .001$, and $\beta = -.117$, $p < .01$, respectively), and in Step 2, perceived control predicted better general health ($\beta = .328$, $p < .001$). The addition of perceived control and optimism in Step 2 resulted in an increment in R^2 (R^2 change = .125, $p < .001$). The effect of falls was reduced from Step 1 to Step 2 ($\beta = -.046$, $p > .05$) and became non-significant, suggesting the effect of falls was partially mediated by perceived control.

The model was significant for physician visits, $F(7, 473) = 5.23$, $p < .001$. As evident in Table 7, experiencing a fall predicted more physician visits ($\beta = .184$, $p < .001$). The addition of perceived control and optimism in Step 2 did not result in an increment in R^2 (R^2 change = .011, $p = .067$), nor did perceived control or optimism

predict physician visits. Falls remained a significant predictor of physician visits (β =.157, $p < .001$).

The model was significant for hospital admissions, $F(7, 476) = 7.76$, $p < .001$. As evident in Step 1 in Table 7, being older, not having a committed relationship, and experiencing a fall predicted more hospital admissions ($\beta = .121$, $p < .01$, $\beta = .102$, $p < .05$, and $\beta = .200$, $p < .001$, respectively). In Step 2, age predicted more hospital admissions ($\beta = .116$, $p < .05$) and perceived control predicted fewer hospital admissions ($\beta = -.144$, $p < .01$). The addition of perceived control and optimism in Step 2 resulted in an increment in R^2 (R^2 change = .015, $p < .05$). The effect of falls was reduced from Step 1 to Step 2 ($\beta = .167$, $p < .001$), suggesting the effect of falls was partially mediated by perceived control.

Impact of falling on well-being. Results showed the overall model including falls, age, gender, marital status, and education as predictors entered in Step 1, and optimism and perceived control entered in Step 2 was significant for depression, $F(7, 473) = 27.61$, $p < .001$. As evident in Step 1 in Table 7, not having a committed relationship and experiencing a fall predicted more depression ($\beta = .256$, $p < .001$ and $\beta = .149$, $p < .001$, respectively), whereas education predicted less depression ($\beta = -.097$, $p < .05$). In Step 2, perceived control and optimism predicted less depression ($\beta = -.210$ and $\beta = -.303$, $p < .001$ respectively) and not having a committed relationship predicted more depression ($\beta = .179$, $p < .001$). The addition of perceived control and optimism in Step 2 resulted in an increment in R^2 (R^2 change = .177, $p < .001$). The effect of falls was

reduced from Step 1 to Step 2 (β = .088 p < .05), suggesting the effect of falls was partially mediated by perceived control.

The model was also significant for stress, $F(7, 476) = 25.27$, $p < .001$. As evident in Step 1 in Table 7, experiencing a fall predicted more stress (β = .135, $p < .01$) and education predicted less stress (β = -.159, $p < .001$). In Step 2, age, education, perceived control and optimism predicted less stress (β = -.092, $p < .05$, β = -.096, $p < .05$, β = -.215, $p < .001$, and β = -.357, $p < .001$, respectively). The addition of perceived control and optimism in Step 2 resulted in an increment in R^2 (R^2 change = .223, $p < .001$). The effect of falls was reduced from Step 1 to Step 2 (β = .072, $p > .05$), and became non-significant, suggesting the effect of falls was mediated by perceived control.

Together, results based on the cross-sectional analyses in 2008 showed that as expected experiencing a fall predicted lower levels of perceived control, however, falling did not predict optimism, suggesting perceived control may be a more important mediator than optimism for older adults in this study. Experiencing a fall predicted poorer general health, less physical activity, and more hospital admissions, depression, and stress; effects which were mediated by perceived control. Experiencing a fall also predicted more physician visits, although not mediated by perceived control or optimism.

Impact of Falling on Health and Well-being in 2010

After examining the cross-sectional impact of suffering a fall on health and well-being, the next objective was to assess the two- year impact of falling on subsequent health and well-being. According to Hypothesis 2a, experiencing a fall in 2008 would predict poorer subsequent health (i.e., general health, physical activity, illness-related

physician visits, and hospital admissions) and poorer subsequent well-being (depressive symptomology, perceived stress) in 2010. According to Hypothesis 2b, that perceived control and dispositional optimism in 2008 would mediate the cross-sectional links between falls reported in 2008 and health and well-being in 2010 such that falls would negatively predict perceived control and optimism in 2008, which in turn will predict better subsequent health and well-being in 2010.

To test these hypotheses, a series of linear regression analyses were conducted to examine the effect of falling on general health, physical activity, physician visits, hospital admission, depression, and stress measured in 2010, with the dichotomous falls measure (falls vs. no falls), age, gender, marital status (married/not married), and education, as measured in 2008, entered in Step 1, and optimism and perceived control, as measured in 2008, entered in Step 2.

Longitudinal impact of falling on subsequent health. Results showed the overall model including falls, age, gender, marital status, and education from 2008 as predictors entered in Step 1, and optimism and perceived control from 2008 entered in Step 2 was significant for general health, $F(7, 409) = 9.17$, $p < .001$. As evident in Step 1 in Table 8, not having a committed relationship and suffering a fall predicted poorer general health ($\beta = -.186$, $p < .001$, and $\beta = -.123$, $p < .05$, respectively). In Step 2, perceived control positively predicted general health ($\beta = .203$, $p < .001$) and not having a committed relationship predicted poorer general health ($\beta = -.136$, $p < .01$). The addition of perceived control and optimism in Step 2 resulted in an increment in R^2 (R^2 change = .057, $p < .001$). The effect of falls was reduced from Step 1to Step 2 ($\beta = -.086$, $p > .05$)

and became non-significant, suggesting the effect of falls was partially mediated by perceived control.

The model was significant for physical activity, $F(7, 408) = 14.84$, $p < .001$. As evident in Table 8, being older and not having a committed relationship predicted lower physical activity two years later ($\beta = -.182$, $p < .001$, and $\beta = -.189$, $p < .001$, respectively), whereas experiencing a fall did not predict physical activity ($\beta = -.022$, $p > .05$). In Step 2, perceived control and optimism positively predicted later physical activity ($\beta = .251$, $p < .001$, and $\beta = .163$, $p < .001$, respectively) and being older and not having a committed relationship predicted lower physical activity ($\beta = -.135$, $p < .01$, and $\beta = -.117$, $p < .05$, respectively). The addition of perceived control and optimism in Step 2 resulted in an increment in R^2 (R^2 change = .113, $p < .001$). The effect of falls remained non-significant ($\beta = .026$, $p > .05$).

The model was significant for physician visits, $F(7, 407) = 2.09$, $p < .05$. As evident in Table 8, experiencing a fall in 2008 did not predict physician visits two years later ($\beta = .091$, $p > .05$), whereas not having a committed relationship predicted more physician visits ($\beta = .114$, $p < .05$). The addition of perceived control and optimism in Step 2 did not result in an increment in R^2 (R^2 change = .004, $p = .178$). The effect of falls remained non-significant ($\beta = .084$, $p < .05$).

The model was significant for hospital admissions, $F(7, 409) = 3.81$, $p < .001$. As evident in Table 8, being older, being a woman and experiencing a fall in 2008 predicted more hospital admissions two years later ($\beta = .117$, $p < .05$, $\beta = .123$, $p < .05$, and $\beta = .118$, $p < .05$, respectively). In Step 2, perceived control predicted fewer subsequent

hospital admissions (β = -.147, p < .01) and being a woman predicted more hospital admissions (β = .116, p < .05). The addition of perceived control and optimism in Step 2 resulted in an increment in R^2 (R^2 change = .018, p < .05). The effect of falls was reduced from Step 1 to Step 2 (β = .096, p > .05) and became non-significant, suggesting the effect of falls was mediated by perceived control.

Longitudinal impact of falling on subsequent well-being. Results showed the overall model including falls, age, gender, marital status, and education as predictors entered in Step 1, and optimism and perceived control entered in Step 2 was significant for depression in 2010, $F(7, 401) = 29.42$, p < .001. As evident in Table 8, experiencing a fall and not having a committed relationship in 2008 predicted more depression in 2010 (β = .135, p < .01, and β = .186, p < .001, respectively). Perceived control and optimism from 2008 predicted later less depression (β = -.332, p < .001, and β = -.294, p < .001, respectively). The addition of perceived control and optimism in Step 2 resulted in an increment in R^2 (R^2 change = .255, p < .001). The effect of falls was reduced from Step 1 to Step 2 (β = .066, p > .05) and became non-significant, suggesting the effect of falls was mediated by perceived control.

The model was significant for stress, $F(7, 407) = 18.06$, p < .001. As evident in Step 1 in Table 8, experiencing a fall in 2008 predicted more stress in 2010 (β = .118, p < .05) and education predicted less stress (β = -.115, p < .05). In Step 2, education, perceived control and optimism predicted later less stress (β = -.093, p < .05, β = -.218, p < .001, and β = -.324, p < .001, respectively). The addition of perceived control and optimism in Step 2 resulted in an increment in R^2 (R^2 change = .197, p < .001). The

effect of falls was reduced from Step 1 to Step 2 (β = .071, p > .05), and became non-significant, suggesting the effect of falls was mediated by perceived control.

In summary, experiencing a fall predicted poorer subsequent health, and more hospital admissions, depression, and stress two years later; effects which were partially or fully mediated by perceived control. Falling did not predict physical activity or physician visits two years later. These results show that suffering a fall can have long-term implications for health and well-being.

Impact of Falling in 2008 on Health and Well-being in 2014-2015

After examining the effect of falls over a two year period, then next objective was to examine an extended seven-year impact of falling. According to Hypothesis 3a, experiencing a fall in 2008 would predict poorer subsequent health (i.e., general health, physical activity, illness-related physician visits, and hospital admissions) and poorer subsequent well-being (depressive symptomology, perceived stress) seven years later (in 2014-2015). According to Hypothesis 3b, perceived control and dispositional optimism in 2010 would mediate the longitudinal links between falls reported in 2008 and health and well-being in 2014-2015 such that falls in 2008 would negatively predict perceived control and optimism 2010, which in turn will predict better health and well-being in 2014-2015.

To test these hypotheses, separate regression analyses were first conducted to examine the effects of falling within the past year on perceived control and optimism two years later, with the dichotomous falls measure as a predictor, along with age, gender, marital status (married/not married), and education as covariates. A separate series of

hierarchical regression analyses were then conducted to examine the effect of falling on 2014 – 2015 general health, physical activity, physician visits, hospital admission, depression, and stress, with falling, and the demographic covariates above, entered in Step 1, and 2010 optimism and perceived control in Step 2.

Longitudinal impact of falling on subsequent perceived control and optimism. Results showed that the overall models were significant for perceived control, $F(5, 415) = 12.35$, $p < .001$, and for optimism, $F(5, 411) = 4.64$, $p < .001$. As evident in Table 9, being older, not having a committed relationship and experiencing a fall predicted lower levels of perceived control two years later ($\beta = -.236$, $p < .001$, $\beta = -.163$, $p < .001$, and $\beta = -.160$, $p < .001$, respectively). Being older and not having a committed relationship predicted less optimism two years later ($\beta = -.101$, $p < .05$, and $\beta = -.144$, $p < .01$, respectively), whereas gender and education predicted more optimism two years later ($\beta = .108$, $p < .05$, and $\beta = .106$, $p < .05$, respectively). Falls did not significantly predict optimism.

Longitudinal impact of falling on health seven years later. Results showed the overall model including 2008 falls, age, gender, marital status, and education as predictors entered in Step 1, and 2010 optimism and perceived control entered in Step 2 was significant for general health, $F(7, 201) = 6.57$, $p < .001$. As evident in Table 10, being older and not having a committed relationship predicted poorer general health in 2014 – 2015 ($\beta = -.166$, $p < .05$, and $\beta = -.145$, $p < .05$, respectively). Perceived control in 2010 predicted better general health ($\beta = .320$, $p < .001$). The addition of perceived control and optimism in Step 2 resulted in an increment in R^2 (R^2 change = .105, $p <$

.001). The effect of falls was non-significant in both Step 1 (β = -.114, p > .05) to Step 2 (β = -.043, p > .05).

The model was non-significant for physical activity, $F(7, 204) = .928$, $p = .486$.

The model was significant for physician visits, $F(7, 202) = 2.09$, $p < .05$. As evident in Table 10, experiencing a fall did not significantly predict physician visits (β = .001, p > .05). The addition of perceived control and optimism in Step 2 resulted in an increment in R^2 (R^2 change = .033, $p < .05$). Perceived control predicted fewer physician visits (β = -.207, $p < .01$), whereas the effect of falls remained non-significant (β = -.036, p > .05), suggesting the effect of falls was not mediated by perceived control.

The model was non-significant for hospital admissions, $F(7, 175) = 1.36$, p = .225.

Longitudinal impact of falling on well-being seven years later. Results showed the overall model including 2008 falls, age, gender, marital status, and education as predictors entered in Step 1, and 2010 optimism and perceived control entered in Step 2 was significant for depression, $F(7, 194) = 6.35$, $p < .001$. As evident in Table 10, being older predicted more depression in 2014 – 2015 (β = .143, $p < .05$), whereas education predicted less depression in 2014 – 2015 (β = -.161, $p < .05$). Falls did not significantly predict depression in 2014 – 2015 (β = .134, p > .05). In Step 2, not having a committed relationship predicted more depression (β = .176, $p < .05$), education and perceived control predicted less depression (β = -.163, $p < .05$ and β = -.190, $p < .05$, respectively). The addition of perceived control and optimism in Step 2 resulted in an increment in

R^2 (R^2 change = .059, $p < .001$). The effect of falls became marginally significant (β = .089, $p > .05$).

The model was significant for stress, $F(7, 199) = 2.33$, $p < .05$. As evident in Table 10, experiencing a fall did not predicted stress (β = .109, $p > .05$). Optimism predicted less stress (β = -.183, $p < .05$). The addition of perceived control and optimism in Step 2 resulted in an increment in R^2 (R^2 change = .038, $p < .05$). The effect of falls remained non-significant (β = .093, $p > .05$), suggesting the effect of falls was not mediated by perceived control and optimism.

In summary, experiencing a fall in 2008 predicted lower levels of perceived control two years later, whereas falling did not predict optimism, suggesting perceived control may be a more important mediator than optimism for older adults in this study. Experiencing a fall did not predict general health, physical activity, physician visits, hospital admissions and stress seven years later, which suggests the effects of falls do not extend to impact health seven years later. Falls did, however, marginally predict depression, but only with perceived control and optimism in the model. These findings suggest falls may have an impact on health and well-being up to two-year later.

Effects of Falling in 2008 and Perceived Control and Optimism in 2010 on survival in 2014-2015

After examining the effect of falls over a seven year period, next objective was to examine longer term effects of falling on seven-year likelihood of survival. Examination of survival rates showed that 80 (16%) of the participants from 2008 had passed away by the data collection in 2014-2015. As evident in Table 11, retrospective mean comparisons

of differences in 2010 health and well-being between survivors vs. non-survivors indicate that survivors had significantly lower levels of depression, higher perceived control, fewer hospital admissions, experienced fewer falls, and rated their general health and physical activity as significantly better than those who did not survive by the 2014-2015 follow-up. Retrospective mean comparisons of differences in 2008 health and well-being between survivors vs. non-survivors were also examined. As evident in Table 12, those who survived through the full seven-year study period had significantly lower levels of depression, higher perceived control, fewer falls, physician visits, and hospital admissions, and rated their current health and physical activity as significantly better than those who did not survive.

According to Hypothesis 3c, it was expected that falling in 2008 would negatively predict the likelihood of survival in 2014-2015. According to Hypothesis 3d, it was also expected that perceived control and dispositional optimism in 2010 would mediate the longitudinal links between falls reported in 2008 and survival in 2014-2015 such that falls in 2008 would negatively predict perceived control and optimism in 2010, which in turn will predict more likelihood of survival in 2014-2015. To test these hypotheses, a hierarchical binary logistic regression analysis was conducted to examine the effect of falling on survival (1 = deceased, 0 = alive) in 2014-2015, with falling, and the demographic predictors above, entered in Step 1, and optimism and perceived control in Step 2.

Effects of falling on survival in 2014-2015. The logistic regression model including 2008 falls, age, gender, marital status, and education as predictors entered in

Step 1, and 2010 optimism and perceived control entered in Step 2 was significant, $\chi 2(7) = 73.01$, $p < .001$. The model explained 30% (Nagelkerke $R^2 = 0.30$) of the variance in survival rates and correctly classified 89.3% of cases. As evident in Step 1 in Table 13, being a woman and having a committed relationship in 2008 predicted greater likelihood of survival in 2014-2015 ($z = 7.95$ and $z = 1.21$, respectively), whereas 2008 falls and being older, and ($z = 9.74$ and $z = 28.47$, respectively), predicted less likelihood of survival in 2014-2015. In Step 2, being a woman and having a committed relationship in 2008 continued to predict greater likelihood of survival in 2014-2015 ($z = 8.64$ and $z = 10.17$, respectively), whereas 2008 falls and being older, and ($z = 8.82$ and $z = 22.91$, respectively), predicted less likelihood of survival in 2014-2015. The effect of optimism and perceived control was not significant ($z = 1.23$ and $z = 1.92$) was not significant. These findings suggest there is a long-term effect of falls over seven years, which is not mediated by optimism or perceived control.

CHAPTER IV

DISCUSSION

Suffering a fall negatively impacts health and well-being among older adults living in the community. The current study examined the cross-sectional and longitudinal (2-year and 7-year) impact of falling on the health and well-being of older adults and considered the mediating roles of perceived control and dispositional optimism. As subsequently described, suffering a fall was associated with poorer short-term and longer term health outcomes and diminished short and longer-term well-being. Moreover, perceived control mediated several of the links between falling and health/well-being.

The Impact of Falling on Health

Examining the impact of falling on health showed that, as expected, suffering one or more falls in the past year predicted poorer general health and more hospital admissions both cross-sectionally and two-years later. Also as expected, falling predicted less physical activity and more physician visits cross-sectionally, although these associations did not extend longitudinally. Together, these results are consistent with previous studies showing that falls negatively impact health by, for example, leading to injuries, fractures, and a length recovery post-fall (Kempen et al., 2003; Salva et al., 2004; Hadjistavropoulos et al., 2012).

Contrary to what was expected, an examination of the seven-year impact showed no significant effect of suffering a fall on any of the health-related outcomes. Thus, while

falling can be detrimental to current and subsequent health outcomes up to two years later, the impact does not extend to seven years later once age, gender, education, and marital status are accounted for. Subsequent research should aim to identify exactly when the impact of falling on health diminishes between the two and seven-year follow-up points.

In addition to examining the short and longer term impact of falling on health, the current study also examined the potential mediating roles of perceived control and dispositional optimism. Contrary to what was expected, suffering a fall did not predict optimism either cross-sectionally or over time. As expected, however, experiencing a fall predicted lower levels of perceived control both cross-sectionally and two years later.

Furthermore, greater perceived control predicted better general health and fewer hospital admissions both cross-sectionally and two years later. Additionally, 2010 perceived control predicted better general health and fewer physician visits five years later. This is consistent with previous studies showing the protective role of perceived control (see for example Ruthig et al., 2007). Perceived control partially mediated the relationship between falling and health outcomes of general health and hospital admissions cross-sectionally as well as two and seven years later. Specifically, suffering a fall diminished perceived control and in turn, lower perceived control predicted poorer general health and more hospital admissions.

Additionally, greater perceived control predicted less physical activity two years later and perceived control mediated the cross-sectional relationship between falling and physical activity. Older adults who had suffered a fall within the prior year (compared to

those who had not fallen) had less perceived control, and in turn were less physically active. These results are consistent with previous findings that perceived control protects against the negative impact of stressful events on emotional experiences, which in turn affect physical health (Infurna et al., 2011). The current results are also consistent with studies showing that greater perceived control contributes to better physical health (Ruthig et al., 2007), functional ability and physiological health (Infurna & Gerstorf, 2014), and is associated with fewer physician visits and fewer hospital admissions (Arbuckle, Pushkar, Chaikelson, & Andres, 1999; Chipperfield, et al., 2012).

Optimism predicted better general health cross-sectionally and more physical activity two years later. Although optimism has previously been found to serve a protective role (see for example Roberto, 1992; Ruthig et al., 2007), the current results reveal that perceived control may be a more important mediator than optimism for older adults in this study. In other words, perceived control appears to buffer the negative impact of suffering a fall on health, whereas optimism does not.

Together the current findings indicate the clearly negative impact of falling on current and longer term health outcomes, which are partially mediated by perceived control. Aside from health outcomes, the impact of falling on older adults' well-being outcomes was also assessed as subsequently described.

Impact of Falling on Well-being

Examining the impact of falling on well-being showed that, as expected, suffering one or more falls in the past year predicted more depressive symptomology and higher levels of stress both cross-sectionally and two-years later. Together, these results are

consistent with prior research showing that falls can diminish older adults' subsequent well-being (Knowlton, 2001; Ruthig et al., 2007; Tiernan et al., 2014).

Contrary to what was expected, an examination of the seven-year impact showed no significant effect of suffering a fall on any of the well-being outcomes. Thus, while falling can be detrimental to current and subsequent well-being outcomes, it appears that the impact does not extend to seven years later once age, gender, education and marital status are accounted for. This diminished impact of falling on well-being after the two-year period parallels the current results for health outcomes. Subsequent research should aim to determine exactly where this limit is between the two and seven- year follow-up points.

Furthermore, older participants with higher levels of perceived control experienced less depression and stress both cross-sectionally and two and seven years later. Also, perceived control partially mediated the relationship between falling and depression and stress both cross-sectionally and two years later. Those older adults who had experienced a fall had less perceived control and in turn less perceived control predicted more depressive symptomology and greater stress compared to those who had not fallen. These results are consistent with previous studies which have shown that perceived control has been linked to well-being (see for example Infurna, Ram, & Gerstorf, 2013; Lang & Heckhausen, 2001; Ruthig et al., 2007) and has been shown to buffer the impact of negative events on emotional experiences (Infurna et al., 2011; Ruthig et al., 2007).

Optimism predicted less depression cross-sectionally, and less stress both cross-sectionally and two and seven years later. This is consistent with previous studies showing the protective role of optimism (see for example Ruthig et al., 2007). Contrary to what was expected, optimism did not mediate the relationship between experiencing a fall and the well-being variables. Although optimism has previously been found to predict subjective well-being among older adults (Ju et al., 2013, Rius-Ottenheim et al., 2012; Ruthig et al., 2007), the current results reveal that perceived control may be a more important mediator than optimism for older adults in this study. In other words, perceived control appears to buffer the negative impact of suffering a fall on well-being, whereas optimism does not.

Together the current findings indicate the clearly negative impact of falling on current and longer term health and well-being outcomes, which are partially mediated by perceived control. Aside from health and well-being outcomes, the impact of falling on survival was also assessed as detailed below.

Falling and Seven-Year Survival

A retrospective comparison of older participants who had survived the seven year span of the study compared to those who did not survive showed that in both 2008 and 2010, survivors experienced significantly fewer falls. In addition, survivors had significantly less depressive symptomology, more perceived control, fewer hospital admissions, rated their general health as better, and were more physically active than those who did not survive the seven-year study period. Survivors also reported significantly fewer physician visits in 2008 than those who did not survive. These results

identified various health and well-being differences between survivors and non-survivors that may be used as risk or protective indicators for survival over time. These results are consistent with other studies which have shown that falls contribute to greater risk of mortality (Rubenstein, 2006), and that perceived control may be a protective factor, which in turn decreases the mortality rates (see for example Chipperfield et al., 2012). Self-reported general health has also been found to be a reliable predictor of objective health in previous studies (see for example Idler & Benyamini, 1997), which is consistent with the current findings where survivors are more likely to rate their general health as better than non-survivors.

Aside from examining retrospective mean differences between survivors vs. non-survivors, the longitudinal impact of suffering a fall was examined as a predictor of likelihood of survival over the seven-year period. Findings indicated that, as expected falls predicted significantly less likelihood of subsequent survival seven years later, even after accounting for age, gender, education and marital status, suggesting that falling puts older adults at greater risk of mortality up to seven years later.

Contrary to the current hypotheses, neither perceived control, nor optimism, mediated the impact of falls on survival. Other studies have found that perceived control can predict survival twelve years later among community-dwelling older adults (Chipperfield, et al., 2012), an effect not found in the current study. These results are, however, consistent with findings from similar studies, which have shown that falls increase the likelihood dying from fall-related injuries, such as hip fractures (Deprey, 2009; Rubenstein, 2006). These results emphasize the importance of evaluating and

screening for falls, as fall preventions may help older adults live longer in addition to maintain good health and well-being. Additionally, among the older adults who did survive the acute impact of suffering a fall, falling continued to predict subsequent survival over the following seven years. This suggests that even though the older adults got through the initial period after falling, their likelihood of surviving seven years later may still be lower as a result of that earlier fall.

The Impact of Sociodemographic Differences on Health and Well-being

Aside from the detrimental impact of falling and the mediating role of perceived control, the current results indicated that several individual differences in sociodemographic factors also predicted older adults' health and well-being. For example, being in a committed relationship benefitted health and well-being among older adults. That is, being in a committed relationship predicted better general health and less depression both cross-sectionally and two years later, with the beneficial effect remaining significant seven years later for general health. Additionally, being in a committed relationship predicted fewer hospital admissions cross-sectionally, as well as more physical activity and fewer physician visits two years later, and greater likelihood of survival seven years later. Thus having a significant other appears to protect health and well-being whereas absence of a committed relationship appears to be harmful to health and well-being in later life (Ruthig, Trisko, & Stewart, 2012). These findings are consistent with prior research, which show that having a partner is beneficial for health and well-being. The benefits of being in a committed relationship on depression, general

health, hospital admissions, and physical activity became non-significant once perceived control and optimism were accounted for.

Aside from having a significant other, education level also played a role in health and well-being among older participants. More education predicted better general health cross-sectionally, less stress and less depression both cross-sectionally and two years later, and less depression seven years later. The benefits of education on stress two years later and depression seven years later became non-significant once perceived control and optimism were accounted for. This is consistent with prior research, which has found that lower SES negatively impacts health and well-being in later life (American Psychological Association, n.d.)

Being a woman predicted more hospital admissions two years later, an effect which became non-significant once perceived control and optimism were accounted for. Being a man predicted less likelihood of survival seven years later. Interestingly, age did not predict health and well-being cross-sectionally. Being older did, however, predict less physical activity and more hospital admissions two years later, and less likelihood of survival seven years later. The impact of age on hospital admissions became non-significant once perceived control and optimism were accounted for. Interestingly, being older predicted poorer general health and more depression seven years later.

Overall, of the sociodemographic factors assessed in the current study, having a committed relationship, education, and age appear to predict health and well-being up to seven years later, whereas gender appears to play a more minor role in predicting health and well-being over time.

Implications

The present study has shown the negative impact of experiencing a fall on health and well-being, suggesting it is important to identify which factors are likely to contribute to someone experiencing a fall in later life. Recent studies show that older adults who engage in a cognitive task, such as serial subtractions or a Stroop test have a decreased walking performance (i.e., more variability in their stride, slower pace, and shorter step length is decreased (Al-Yahya, Dawes, Smith, Dennis, Howells and Cockburn, 2011; Y. Cho, personal communication, April 29, 2016). Likewise, other research shows that engaging in a cognitive task may disrupt stability and increase the likelihood of experiencing a fall among older adults with an impaired balance (Brauer, Woollacott, & Shumway-Cook, 2001). Older adults may engage in various cognitive tasks while they are walking, such as talking on the phone, creating a grocery list in their mind, or thinking about upcoming events, which may impact their walking and lead to a fall. Thus, encouraging older adults to avoid multitasking while walking may help to prevent some falls, and given the current findings, protect subsequent health and well-being.

Aside from avoiding multitasking while walking, various proactive approaches focus on fall prevention programs. Older adults who participate in fall prevention programs may be less likely to experience a fall (Nyman, 2011) and may therefore have better health and well-being. Fall prevention programs such as the “Matter of Balance” addresses fear of falling and strives to increase activity levels among older adults (The Centers for Medicare & Medicaid Services), whereas other programs such as the “FallScape” program and the “The Otago Exercise Program” utilize a multimedia

approach (Panzer, Burleson, Wakefield, & Wolfson, 2008) or improve balance (Smith, Jiang, & Ory, in press) respectively, to decrease the number of falls. These programs may improve older adults' perception of being in control of events and outcomes, and may therefore decrease the risk of falling, and improve health and well-being. The increased perception of being in control may also improve health by mediating the impact of falling on health and well-being up to two years later.

The current study showed that perceived control can mediate the impact of suffering a fall, with falls predicting less perceived control, and in turn, poorer health and well-being. This indicates that falling may decrease someone's belief they can personally influence events and avoid undesired outcomes (see for example Heckhausen & Schulz, 1995; Ferguson & Goodwin, 2010). Thus, older adults who already have low perceived control are at a greater risk in terms of health and well-being if they suffer a fall, compared to older adults who have more perceived control and suffer a fall. Therefore, attempts to bolster perceived control among older adults may provide additional protection if they do suffer a fall. In particular, Ajzen (1971) designed an intervention, based on the Theory of Planned Behavior, which aimed at increasing perceived behavioral control. He found that by changing the belief strength or the value attached to certain beliefs, perceived behavioral control could be improved. Additionally, the majority of the beliefs, on for example the impact of falling, must be in the desired direction. That is, the older adults must have more beliefs about the impact of falling being manageable than not manageable. Older adults could therefore be informed of statistics on the likelihood of experiencing a fall, and interventions and resources could

be made available to those who suffer a fall in order to change the belief about falling being a sign of the imminent loss of functionality, health, and independence. Eventually, the new belief system may change the older adults' attitudes towards suffering a fall, then their subjective norms about falling, and finally their perceived control. The older adults must also be capable of following through with their beliefs, so having them create a plan with a health professional on what they will do if they suffer a fall, and how they will go through with their plan, will likely help maintaining their sense of being in control (Ajzen, 1971; Gollwitzer, 1999).

A recent study has also shown that by having people focus on aspects of their life they can control, health and well-being can be improved (Shim, Crum, & Galinsky, n.d.). Another study showed that interventions aimed at improving perceived control can positively impact well-being among older adults. Reich and Zautra (1989) designed an intervention aimed at increasing perceived control among older adults who had recently lost their significant other, or become disabled. In the pre-intervention component of this intervention, participants review their daily lives, i.e. their choices and decisions, in the context of control. The first of four components of the intervention focused on personal choices, in which participants were presented with stimulus cards containing control-enhancing words, such as "Phone a distant relative you're fond of." The second component focused on enjoyable or beneficial daily activities, such as "Social life," and the participants' freedom in deciding which activities to engage in. The third component emphasized problem solving and acceptance, for "Health matters" and "Loss of friends" for example. The fourth and final component focused on happiness and coping, by using

thoughts and behaviors discussed in the prior components. The results show that the older adults who received the intervention reported having more perceived control and lower levels of stress and depressive symptomology compared to the control group. They were also more likely than others to engage in activities they enjoyed (Reich & Zautra, 1989).

Other psychosocial factors relevant to falls are falls self-efficacy and fear of falling. Falls self-efficacy is one's perceived confidence at avoiding falls in the daily life (Li, et al., 2002). Studies show that low falls self-efficacy increases the likelihood of suffering a fall and decreases one's likelihood of being able to engage in the activities of the daily life. Older adults who are afraid they might suffer a fall appear to have less falls self-efficacy, which in turn negatively impacts their ability to for example sit, stand, and modify one's gate (Li, et al., 2002). Fear of falling may also be particularly debilitating in northern climates, which tend to be covered in snow and have slippery conditions for several months a year. Studies have also shown that individuals with Parkinson's disease, who have suffered a fall, had less falls self-efficacy than others, and they also avoided activities more than others (Nilsson, Drake, & Hagell, 2010). The implications from these studies are that by improving falls self-efficacy, the fear of falling will likely decrease, which is beneficial to one's health. Falls self-efficacy can be improved through exercises and interventions aimed at teaching older adults ways of falling that are less likely to negatively impact their health and well-being. Other aspects of daily life could also be targeted, such as wearing appropriate shoes and being aware of dangers in the home and in the community, such as slippery surfaces or steep stairs, which may decrease one's likelihood of suffering a fall by improving self-efficacy.

Finally, the current results indicated that older adults who have suffered a fall are likely to experience more depression and stress. Therefore, it is important to monitor older adults who have suffered a fall and refer them to psychological services in order to minimize the negative psychological impact of falling on well-being. Cognitive-behavior therapy is commonly and effectively used to treat depressive symptomology and stress by addressing thoughts and behaviors which may contribute to poorer well-being among older adults who have experienced a fall. Other contributors to depression and stress are physical activity level and diet. Individuals who engage in regular exercise typically have lower levels of depression and stress (Manger & Motta, 2005). Likewise, older adults who exercise are less likely to experience a fall compared to more sedentary older adults (see for example Filiatrault & Desrosiers, 2011). Older adults may therefore benefit from meeting with a physician and nutritionist, in addition to a psychologist, and creating an exercise plan all in an attempt to prevent a fall or maintain their well-being should they suffer a fall.

Limitations and Future Directions

This study has a few limitations that could be addressed in future studies. The majority of the participants were Caucasian, with many living in rural areas of the Midwestern United States. Therefore, the results may not extend to older adults living in more racially diverse areas, larger cities, or other geographical regions. For example, the Midwest experiences more snow, ice and low temperatures for a larger portion of the year than most other areas of the country do. Consequently, older Midwestern adults may have limited mobility, and the harsh winter conditions may contribute to their fear of

falling and lower perceived control. In contrast, older adults living in other areas of the country may in turn be able to exercise more often, be less likely to experience a fall, or be able to engage in more activities which may improve health, well-being, and perceived control. Also, among older adults who do suffer a fall, inner-city low-income older adults may have fewer resources than older adults living in the rural Midwest. Racial disparity may also be misrepresented among older adults in urban versus rural areas. A study found that Caucasian older adults are more likely than African American and Hispanic older adults to live in rural areas compared to urban areas, with Caucasian older adults representing roughly 80% of older adults in rural areas but roughly 50% of older adults living in urban areas (Baernholdt, Yan, Hinton, Rose, & Mattos, 2012). A recent study also found that African American older adults are less likely to experience a fall than Latinos and Caucasian older adults (Nicklett & Taylor, 2014). Hispanic and African American older adults were also found to report lower quality of life and poorer well-being, respectively, than others (Baernholdt, Yan, Hinton, Rose, & Mattos, 2012). This suggests certain interventions may be more effective if area (urban vs. rural) and ethnicity is taken into account. Subsequent research should include older adults from a more diverse population and other geographical areas to examine their impact on the relationship between falling and health and well-being.

Data was collected by contacting participants and sending out questionnaires to participants who were willing to participate. Self-selection likely occurred, in which individuals, who had fairly good health and well-being, were more likely to respond to and participate in this study than those with diminished health and well-being. Future

studies should strive to include older adults with poorer health than those in the current study.

A third limitation is that falling was self-reported and dependent upon participants' ability to recall all falls within the past 12 months. Thus, it is possible that some participants may have forgotten about falls they experienced in the past year, or included or excluded falls, which happened more than or less than twelve months ago. Other research methodologies, such as diary studies may be more effective in tracking falls over the course of a year.

The older adults in the present study had experiencing relatively few falls on average (0.55). This makes it difficult to examine the impact of multiple falls on health and well-being. A previous study found, however, that even experiencing a single fall could have a negative impact on health and well-being, compared to not experiencing a fall, with no difference found between a single fall versus multiple falls (Ruthig et al, 2007). This suggests the largest difference is between fallers vs. non-fallers instead of one versus many falls.

Additionally, participants were followed up two and seven years later, leaving it uncertain what happened between the two and seven year follow-up period. Subsequent research may want to track participants on a yearly basis in order to gain more understanding on the gradual impact of falling, the number of falls, and the mediating role of perceived control and optimism on health and well-being. Future research may also want to study the relationship between falls and health and well-being among very old (85 years and older), as they are at greater risk of falling than young-old adults

(Ruthig et al., 2007) like those in the current study who were only an average of 70 years old in 2008

Various factors contribute to a decline in perceived control. Falls have been shown to negatively impact perceived control, but knowing other important impact factors may be crucial as well. Therefore, future studies could examine the impact of factors such as changes in motor skills, major life events, and significant loss on perceived control, factors which have been found to negatively impact perceived control (Chipperfield, et al., 2012). Likewise, identifying a subset of individuals who have experienced a fall, and having them participate in a fall prevention program, would allow for examination of the relationship between falls, perceived control, survival, health, and well-being. For example, research could examine if participation in such a program improved perceived control, and if perceived control mediated the relationship between engaging in a fall prevention program, experiencing a fall, and subsequent health and well-being. This could provide additional information on the mechanism behind fall prevention programs and their impact on health, well-being, and survival.

Finally, subsequent studies could evaluate older adults' walking performance while they engage in various everyday cognitive activities, such as remembering things they need to do, completing a phone call, or reciting a grocery list. Their performance could be compared to the walking performance of older adults engaging in cognitive tasks which tap minimally on the executive functioning area of the brain. This type of study could explore the relationship between cognitive load, health, well-being, history of falling, perceived control, subsequent falls at follow-up, and mortality rates. This line of

research could shed light on everyday cognitive tasks which may contribute to older adults' risk of falling and the potential protective role of perceived control.

Conclusion

Overall, the current study found that experiencing a fall negatively impacted stress levels, depressive symptomology, and multiple health outcomes among community-living older adults, both currently and up to two years later - an impact that was partially mediated by perceived control. Additionally, suffering a fall predicted less likelihood of survival seven years later. Interestingly, among the older adults who survived the initial impact of a fall, falling still predicted survival, showing how critical and long lasting experiencing a fall can be. This study underlines the importance of health professionals screening for falls and perceived control among older adults and referring them to fall prevention programs, physical therapy and psychological services aimed at improving perceived control and self-efficacy or addressing health, stress levels, and depressive symptomology.

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APPENDIX

Table 1. Sample characteristics in 2008 and 2010.

	2008		*2010*	
Variable	*M(n)*	*SD(%)*	*M(n)*	*SD(%)*
Gender				
Men	(214)	(42.9)	(184)	(42.8)
Women	(285)	(57.1)	(246)	(57.2)
Race				
Caucasian	(494)	(99.20)	(426)	(99.1)
African American	(1)	(.2)	(1)	(.2)
Native American	(1)	(.2)	(1)	(.2)
Hispanic	(0)	(0)	(1)	(.2)
Other	(2)	(.4)	(1)	(.2)
Age	70.37	7.99	71.91	7.67
Living with at least one other person				
Yes	(357)	(71.7)		
No	(141)	(28.3)		
Marital Status				
Married/Cohabitating	(371)	(74.10)	(319)	(74.2)
Single/Widowed/ Divorced/Separated	(128)	(25.6)	(111)	(25.8)
Education	-	-	-	-
Bachelor's degree	(233)	(46.8)	(201)	(46.7)
Master's degree	(126)	(25.3)	(104)	(24.2)
Doctorate degree	(53)	(10.6)	(48)	(11.2)
Associate/Tech school/Some college degree	(51)	(10.2)	(50)	(11.6)
High school degree	(30)	(6)	(23)	(5.3)
Less than high school	(5)	(1)	(4)	(.9)
Income				
< 5,000	(1)	(.2)	(1)	(.2)
5,000-9,999	(8)	(1.6)	(8)	(1.9)
10,000-14,999	(6)	(1.2)	(10)	(2.4)
15,000-19,999	(17)	(3.5)	(5)	(1.2)
20,000-24,999	(20)	(4.1)	(17)	(4.1)
25,000-29,999	(29)	(6.0)	(13)	(3.1)
30,000-39,999	(49)	(10.2)	(55)	(13.2)
≥40,000	(352)	(73.0)	(309)	(73.9)

Table 2. Health Variables in 2008 and 2010.

	2008		*2010*		
Variables	*M(n)*	*SD(%)*	*M(n)*	*SD(%)*	*t*
General health	4.11	.80	3.99	.79	4.03***
Dr. visits	4.99	7.89	4.99	10.14	-0.44
Hospital Admissions	0.31	0.78	0.38	0.94	-1.23
Length of Hospitalization	4.99	5.71	7.72	15.18	-1.29
Falls	0.55	1.23	0.69	1.57	-2.09*
Yes	(149)	(29.7)	(217)	(43.3)	
No	(352)	(70.3)	(284)	(56.7)	
Physical Activity	4.69	1.33	4.43	1.30	4.74***

*p<.05, **p<.01, ***p<.001

Table 3. Psychosocial Variables in 2008 and 2010.

	2008			2010			
Measure	*M*	*SD*	*α*	*M*	*SD*	*α*	*t*
Depression	4.08	3.94	.79	4.79	4.34	.83	-3.97***
Stress	15.60	3.91	.79	15.18	4.16	.83	2.56*
Optimism	39.55	5.86	.81	38.68	5.79	.83	3.82***
Perceived Control	56.24	8.04	.88	55.66	9.14	.88	1.82

*p<.05, **p<.01, ***p<.001

Table 4. Correlations among study variables in 2008.

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1.Age	1	-.08	-.07	.16***	-.08	-.16***	.10*	.16***	.08	.14**	-.01	-.04	-.25***
2.Education		1	-.31***	-.23***	.16***	.07	-.08	-.06	-.09*	-.14**	-.18***	.07	.10*
3.Gender			1	.22***	-.03	-.11*	.03	.06	.16***	.04	.107*	.08	.01
4.Marital Status				1	-.19***	-.26***	.10*	.15***	.07	.28***	.09	-.15***	-.20***
5.General Health					1	.42***	-.30***	-.28***	-.18***	-.31***	-.26***	.25***	.39***
6.Physical Activity						1	-.19***	-.21***	-.15***	-.32***	-.25***	.26***	.42***
7.Dr. visits							1	.49***	.20***	.19***	.11*	-.07	-.17***
8.Hospital Admission								1	.22***	.18***	.10*	-.05	-.20***
9.Falls									1	.17***	.15***	-.04	-.23***
10.Depression										1	.58***	-.43***	-.42***
11.Stress											1	-.45***	-.38***
12.Optimism												1	.46***
13.Perceived Control													1

*$p<.05$, **$p<.01$, ***$p<.001$

Table 5. Correlations among study variables in 2010.

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1.Age	1	-.07	-.07	.17***	-.11*	-.23***	.09	.10*	.11*	.18***	.03	-.14**	-.27***
2.Education		1	-.28***	-.23***	.14**	.09	-.02	-.01	-.00	-.10*	-.14**	.10*	-.01
3.Gender			1	.24***	-.08	-.05	.07	.12*	.11*	.06	.11*	.06	.02
4.Marital Status				1	-.23***	-.24***	.14**	.01	.00	.25***	.06	-.19***	-.19***
5.Genral Health					1	.41***	-.35***	-.27***	-.15**	-.38***	-.22***	.23***	.34***
6.Physical Activity						1	-.25***	-.26***	-.16***	-.39***	-.24***	.26***	.40***
7.Dr. Visits							1	.30***	.09	.18***	.08	-.03	-.14**
8.Hospital Admission								1	.18***	.16***	.03	.01	-.17***
9.Falls									1	.20***	.16***	-.04	-.10*
10.Depression										1	.66***	-.47***	-.55***
11.Stress											1	-.46***	-.43***
12.Optimism												1	.47
13.Perceived Control													1

*p<.05, **p<.01, ***p<.001

Table 6. Predicting Perceived Control and Optimism.

	Perceived Control			Optimism		
Predictors	*B*	*SE*	*β*	*B*	*SE*	*β*
Age	-0.21	.05	-0.20***	0.00	0.03	0.01
Gender	1.40	.77	0.08	1.76	0.56	0.15**
Marital Status	-2.86	.85	-0.15***	-2.15	0.61	-0.17***
Education	0.53	.36	0.07	0.49	0.26	0.09
Falls	-3.73	.78	-0.21***	-0.55	0.57	-0.04
R^2		.13***			0.03***	

*p<.05, **p<.01, ***p<.001

Table 7. Predicting Health and Well-being in 2008.

	General Health		*Physical Activity*		*Dr. Visits*		*Hospital Admisasion*		*Depression*		*Stress*	
	Step 1	*Step 2*	*Step 1*	*Step 2*	*Step 1*	*Step 2*	*Step 1*	*Step 2*	*Step 1*	*Step 2*	*Step 1*	*Step 2*
Predictors	*β*	*β*	*β*	*β*	*β*	*β*	*β*	*β*	*β*	*β*	*β*	*β*
Age	-.020	.018	-.117**	-.052	.063	.045	.121**	.116*	.068	.016	-.038	-.092*
Gender	.086	.038	-.043	-.090*	-.031	.019	.012	.037	-.067	-.005	.009	.078
Marital Status	-.170***	-.060	-.218***	-.148***	.068	.071	.102*	.089	.256***	.179***	.055	-.037
Education	.140**	.126**	-.003	-.028	-.060	-.060	-.008	-.003	-.097*	-.045	-.159***	-.096*
Falls	-.167***	-.117**	-.117**	-.046	.184***	.157***	.200***	.167***	.149***	.088*	.135**	.072
Perceived Control	-	.295***	-	.328***	-	-.096	-	-.144**	-	-.210***	-	-.215***
Optimism	-	.098*	-	.089	-	-.026	-	.041	-	-.303***	-	-.357***
R^2	.074***	.182***	.089***	.211***	.044	.058	.070	.089	.107	.280	.045	.260***

*$p<.05$, **$p<.01$, ***$p<.001$

Table 8. Predicting Health and Well-being in 2010.

	General Health		*Physical Activity*		*Dr. Visits*		*Hospital Admisasion*		*Depression*		*Stress*	
	Step 1	*Step 2*	*Step 1*	*Step 2*	*Step 1*	*Step 2*	*Step 1*	*Step 2*	*Step 1*	*Step 2*	*Step 1*	*Step 2*
Predictors	*β*	*β*	*β*	*β*	*β*	*β*	*β*	*β*	*β*	*β*	*β*	*β*
Age	-.069	-.034	-.182***	-.135**	.027	.021	.117*	.098	.117	.061	.019	-.031
Gender	-.006	-.022	-.038	-.063	.011	.016	.123*	.116*	-.004*	.033	.049	.089
Marital Status	-.186***	-.136**	-.189***	-.117*	.114*	.101	-.018	-.025	.186***	.082	.013	-.084
Education	.079	.074	.018	.007	-.048	-.045	.050	.043	-.030	-.006	-.115*	-.093*
Falls	-.123*	-.086	-.022	.026	.091	.084	.118*	.096	.135**	.066	.118*	.071
Perceived Control	-	.203***	-	.251***	-	-.030	-	-.147**	-	-.332***	-	-.218***
Optimism	-	.086	-	.163***	-	-.044	-	.100	-	-.294***	-	-.324***
R^2	.067***	.121***	.078***	.189***	.019	.018	.032	.045	.073***	.328***	.028**	.224***

*$p<.05$, **$p<.01$, ***$p<.001$

Table 9. Predicting Perceived Control and Optimism in 2010.

	Perceived Control			Optimism		
Predictors	*B*	*SE*	*β*	*B*	*SE*	*β*
Age	-0.29	0.06	-0.24***	-0.08	0.04	-0.10*
Gender	0.41	0.93	0.02	1.28	0.62	0.11*
Marital Status	-3.44	1.03	-0.16***	-1.96	0.70	-0.14**
Education	-0.58	0.44	-0.07	0.61	0.29	0.11*
Falls	-3.20	0.94	-0.16***	-0.17	0.63	-0.01
R^2		0.12***			0.04***	

*p<.05, **p<.01, ***p<.001

Table 10. Predicting Health and Well-being in 2014.

	General Health		*Physical Activity*		*Dr. Visits*		*Hospital Admisasion*		*Depression*		*Stress*	
	Step 1	*Step 2*	*Step 1*	*Step 2*	*Step 1*	*Step 2*	*Step 1*	*Step 2*	*Step 1*	*Step 2*	*Step 1*	*Step 2*
Predictors	*β*	*β*	*β*	*β*	*β*	*β*	*β*	*β*	*β*	*β*	*β*	*β*
Age	-.166*	-.120	.009	.017	.093	.064	.121**	.116*	.143*	.105	.093	.071
Gender	.057	.016	.073	.072	.109	.121	.012	.037	-.074	-.040	.032	.062
Marital Status	-.145*	-.087	-.168*	-.163*	.070	.045	.102*	.089	.228	.176*	-.004	-.039
Education	.109	.117	-.041	-.036	-.032	-.045	-.008	-.003	-.161*	-.163*	-.112	-.099
Falls	-.114	-.043	-.003	.007	.001	-.036	.200***	.167***	.134	.089	.109	.093
Perceived Control	-	.320***	-	.059	-	-.207**	-	-.144**	-	-.190*	-	-.035
Optimism	-	.041	-	-.033	-	.057	-	.041	-	-.109	-	-.183*
R^2	.059**	.158***	.005	-.002	.011	.035*	.014	.014	.105***	.157***	.014	.043*

*$p<.05$, **$p<.01$, ***$p<.001$

Table 11. Comparison of means in 2010 by survival status.

	Alive		Deceased		
Measure	*M*	*SD*	*M*	*SD*	*t*
Depression	4.59	4.31	6.18	4.37	-2.45*
Stress	15.10	4.17	15.74	4.11	-1.04
Optimism	38.57	5.91	38.92	5.29	-0.43
Perceived Control	56.22	8.51	52.27	12.28	2.25*
General health	4.05	0.76	3.62	0.95	3.12**
Physician Visits	4.26	6.58	10.15	22.36	-1.91
Hospital Admission	0.28	0.71	1.01	1.80	-2.92**
Physical Activity	4.50	1.28	3.94	1.34	2.96**
Falls	0.38	0.49	0.70	0.46	-5.59***

*p<.05, **p<.01, ***p<.001

Table 12. Comparison of means in 2008 by survival status.

	Alive		Deceased		
Measure	*M*	*SD*	*M*	*SD*	*t*
Depression	3.92	3.96	5.08	3.92	-2.73*
Stress	15.35	3.83	15.80	4.30	-0.95
Optimism	39.86	5.72	38.90	5.57	1.37
Perceived Control	56.87	7.87	51.87	9.10	4.99***
General health	4.19	0.73	3.70	1.01	5.09***
Physician Visits	4.45	6.18	7.92	13.54	-3.61*
Hospital Admission	0.24	0.68	0.63	1.12	-4.07**
Physical Activity	4.78	1.29	4.25	1.43	3.26***
Falls	0.27	0.44	0.44	0.50	-3.01**

*p<.05, **p<.01, ***p<.001

Table 13. Predicting Survival in 2014-2015.

	Step 1			*Step 2*		
Variables	*β*	Wald Test (z)	Odds Ratio	*β*	Wald Test (z)	Odds Ratio
Age	-0.11	28.47***	2.90	-0.11	22.91***	0.90
Sex	1.07	7.95**	2.91	1.13	8.64**	3.10
Marital Status	1.21	10.16**	3.34	1.23	10.17**	3.41
Education	-0.14	0.86	0.87	-0.10	0.37	0.91
Falls	-1.06	9.74**	2.90	-1.03	8.82**	2.79
Perceived Control				-0.05	1.92	0.95
Optimism				0.02	1.23	1.02

*p<.05, **p<.01, ***p<.001