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Managing fear of falling through strategies of selection, optimization & compensation

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Managing Fear of Falling through Strategies

of Selection, Optimization, & Compensation

by

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MASTER'S THESIS

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Breanne M. Wise
June 28, 2011

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A Thesis
Presented to
The Faculty of
Western Washington University

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Abstract

Fear of falling, Selective Optimization with Compensation (Baltes & Baltes, 1990), and activity level were investigated in older women (65+) who self-identified as being worried about falling. During this study, 88 women completed questionnaires which assessed fear of falling, falls self-efficacy, mood, SOC strategy use, and well-being. In addition, participants were asked to fill out a daily assessment and wear a pedometer to monitor physical activity level for two weeks. Physical activity level was measured by steps (total number of steps taken) and moderate steps (aerobic activity steps sustained for 10+ minutes). Participants who reported using more SOC Optimization strategies took more moderate steps; those who reported fear-based activity restriction took fewer steps and moderate steps. Fear of falling interventions researchers might benefit from utilizing SOC theory as older women may be able to manage fear of falling and maintain an active lifestyle by incorporating strategies of SOC Optimization.

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Managing Fear of Falling through Strategies

of Selection, Optimization & Compensation

With the fastest growing population in the U.S. being those over 80, and a record number of adults turning 60 every year since 2006 (Hobbs, 2008), there is growing concern for the health and well-being of this age group. For many, growing old brings an increase in physical limitations such as decreased mobility and motor function (Holmes, Powell-Griner, Lethbridge-Cejku, & Heyman, 2009). In turn, these changes can lead to decreased independence. Injuries in particular can be detrimental for older adults; in fact, fall-related injuries are the primary cause of trauma-related hospital admissions and injury related deaths for older adults (Centers for Disease Control, 2005; Wilkins, 1999). Considering that about one-third of older adults over the age of 65 experience a fall each year (Hausdorff, Rios, & Edelber, 2001), it is important to examine fall-related behaviors and beliefs that may impact well-being in later life.

Fear of falling plays an important role in the health and well-being of older adults because it may be one of the most prevalent fears among people over the age of 65. Researchers have found that somewhere between 26% and 55% of older adults living in the community have a fear of falling (Arfken, Lach, Birge, & Miller, 1994; Bertera & Bertera, 2008; Bruce, Devine, & Prince, 2002; Howland et al., 1993; Murphy, Dubin, & Gill, 2003; Murphy, Williams, & Gill, 2002; Tinetti, Mendes de Leon, Doucette, & Baker, 1994). Moreover, Howland et al. (1993) found that older adults were more fearful of falls and saw falls as a more pertinent risk than getting robbed, forgetting an appointment, having financial problems, or losing something important. Women are most likely to develop a fear

of falling and display higher levels of fear of falling than men (Arfken et al., 1994; Kempen, van Haastregt, McKee, Delbaere, & Zijlstra, 2009; Lach, 2005). Therefore, fear of falling is a particularly important issue for older women.

Development of Fear of Falling

Fear of falling is a belief that can develop from many different circumstances. Researchers have suggested that beliefs and fear can manifest themselves through vicarious experience, exposure to information, and personal experience (Bandura, 1977; Rachman, 1977).

Fear of falling, like other fears, can develop from a vicarious experience (Vellas, Wayne, Romero, Baumgartner, & Garry, 1997). A classic study conducted by Bandura (1977) found that people can become motivated to change their behavior (become fearful) after witnessing the consequences of another's actions. Research by Lachman et al. (1998) found that older adults who knew a friend or relative who had fallen showed greater fear of falling compared to people who did not know anyone who had fallen. Moreover, researchers have shown that fear can develop after witnessing an event portrayed in the media. Participants who witnessed a video of a deadly event were more worried about similar events happening in their own lives and were more likely to avoid activities in which the deadly event could potentially happen (Cantor & Omdahl, 1991). Thus, it is possible that some individuals are fearful of falling even though they have not experienced a fall nor any physical changes that would increase the probability of a fall.

Personally, experiencing a fall often leads to the development of fear (Tinetti et al., 1994). Friedman, Munoz, West, Rubin, & Fried (2002) found that older adults who reported

a history of a fall at baseline were twice as likely as people who had not fallen to report fear of falling 20 months later. Among older adults with a fear of falling, 61% have personally experienced a fall (Delbaere, Crombez, Van Den Noortgate, Willems, & Cambier, 2006). The perceived seriousness of a fall can also impact how likely older adults are to develop a fear of falling. Researchers reported that 29% of those with non-serious falls (no or minimal injuries), and 41% of those with serious falls (severe injuries) reported a fear of falling (Howland et al., 1993).

Even if people do not experience a fall themselves, other personal experiences, such as health-related factors, can lead people to develop a fear of falling. Such personal health-related factors often relate to perceptions of stability and mobility, but are certainly different from experiencing a fall first-hand. For example, Lach (2005) asked participants to rate their own health and found that participants who reported fair or poor health were almost twice as likely as those in good health to report a fear of falling. People in poor health who are experiencing losses in their physical resources, such as dizziness or unsteadiness, are also more likely to develop a fear of falling (Yardley, 2003). Chronic pain sufferers, especially those with high intensity pain, are more likely to be afraid of falling (Friedman et al., 2002; Williams, Hadjistavropoulos, & Asmundson, 2005). Additionally, those who require the use of a walking aid (cane, walker, crutch) are three times more likely to develop a fear of falling than those who walk unassisted (Howland et al., 1993; Kressig et al., 2001). Hadjistavropolous et al. (2007) found that when people develop physical limitations, they become fearful of the consequences of a fall. Such fear, in turn, is expected to motivate fear related activity restriction (Yardley & Smith, 2002).

Decreased Physical Ability and Threats to Lifestyle

After individuals develop a fear of falling from any source, many begin to restrict their activities (Bertera & Bertera, 2008; Delbaere, Crombez, Vanderstraeten, Willems, & Cambier, 2004; Deshpande et al., 2008), which can threaten people's lifestyle. Deshpande et al. found that of the 63% of their sample who reported some degree of fear of falling, 75% of these people reported restricting their activities. Activity restriction is dangerous because it can have a wide variety of consequences that are detrimental to overall well-being. For example, older adults who are less mobile often begin to display more depressive symptoms (Fonda, Wallace, & Herzog, 2001) and, consequently, lower levels of well-being (Ryff, 1989) than those who are more mobile. In addition to psychological consequences, physical consequences also take a toll on older adults with a fear of falling. Researchers have shown that activity avoidance mediates the relationship between fear of falling and actual falls (Wijlhuizen, de Jong, & Hopman-Rock, 2006). Therefore, older adults who restrict their activities actually put themselves at greater risk for experiencing a fall.

One reason that activity avoidance mediates the relationship between fear and falls is because of the type of activities that are typically avoided. The most commonly avoided activities are those that require mobility (Delbaere et al., 2004). Bertera and Bertera (2008) found that two-thirds of people with a fear of falling avoid activities such as going outside, walking, reaching overhead, or lifting heavy objects. Since older adults with a fear of falling most often restrict activities that require mobility, they lose strength because their muscles become deconditioned. Maki, Holliday, and Topper (1991) found that older adults with a high level of fear of falling perform worse on physical fitness tasks than older adults who

are frequent fallers who do not display fear. Additionally, Delbaere et al. (2004) found that people who limit their activities because of fear perform worse than those without fear on balance performance tasks and muscle strength tasks. Brouwer, Musselman, and Culham (2004) discovered that people with a fear of falling walked slower and had weaker lower limbs than those with no fear of falling. Thus, fear-induced declines in physical fitness may also be responsible for the presence of abnormal gait or postural control, which in turn increase the risk of a fall (Delbaere et al., 2006).

As fear of falling increases, activity restriction becomes more severe and eventually begins to affect activities of daily living (ADLs). ADLs are basic activities, such as dressing or bathing, that are necessary for independent living. Avoiding a single ADL leads to decreased ability to perform other ADLs over time, thus making it more likely that the older adult will become house-bound and in need of a great deal of assistance (Suzuki, Ohyama, Yamada, & Kanamori, 2002). Furthermore, people who require assistance with ADLs are in much greater danger of experiencing a fall in the next year than those who perform their own ADLs (Delbaere et al., 2004). Ultimately, the need for assistance with ADLs and/or physical limitations due to a fall makes it more likely that older adults will be institutionalized (Sonn, Grimby, & Svanborg, 1996), therefore decreasing their quality of life.

Managing Fear of Falling

It is clear that older adults can work to control their beliefs because not all people who report a fear of falling limit their activities as a way to manage fear (Lachman et al., 1998). Indeed people who do not restrict activities can be considered successful agers

because they have found a way to manage their fear and maintain an active and healthy lifestyle. Generally, successful aging requires each individual to find ways to manage physical, psychological, and/or social adversity in order to maximize quality of life (Baltes & Baltes, 1990). Successful adaptation requires high levels of self-efficacy, strategies for adapting to challenges, and goals (Baltes & Baltes). In other words, people who are better able to manage adversity (e.g., fear of falling) are more successful at maintaining their goals related to their well-being (e.g., keeping physically active).

A prominent lifespan psychology model, Selective Optimization with Compensation (SOC: Baltes & Baltes, 1990; Freund, Li, & Baltes, 1999; Freund & Riediger, 2001), outlines ways in which older adults can actively manage adversity and set-backs (e.g., fear of falling) to optimize late life development (i.e., maintaining an active/independent lifestyle). Although SOC is not specifically a fear reduction model, fear of falling, like any negative belief or adversity, can be managed by using SOC. The model consists of four components: elective based selection, loss-based selection, optimization, and compensation. These components of the model can be used together or to allow the individual to recognize developmental goals and manage goal-oriented behavior; thus allowing people to identify what is important to them and to choose what activities are most essential to maintaining their quality of life. Although they are commonly used together, the components of the model can also be used separately because each SOC strategy can be understood as a separate process which individually contributes to successful aging (Freund & Baltes, 1998). Individuals with more resources (e.g., higher cognitive levels, more social support) are more successful at using SOC.

The concept of selection allows individuals to identify domain specific goals (Baltes & Baltes, 1990). Elective based selection occurs when an individual experiences new demands on performance or functioning and chooses to limit involvement in that particular domain (Baltes & Baltes, 1990; Baltes & Cartensen, 1999; Freund et al., 1999; Freund & Riediger, 2001). It involves narrowing one's goals to those that are more important and organizing goals into a hierarchy so that the most important goals will receive the most resources. People with a fear of falling could use elective selection to highlight specific activities, which might include doing their own shopping or meeting with friends outside the house, that are most important to maintaining their independence and well-being. Successfully specifying and organizing goals is only possible if the individual is committed to pursuing those goals.

Loss-based selection is different from elective selection because it does not involve a choice, but rather a limitation of resources that motivates change or adaptation. With this type of selection, an individual no longer has adequate resources to maintain an adequate level of performance or functioning to participate in a given activity (Baltes & Baltes, 1990). When people experience loss-based selection, they must reorganize their goals so they focus on their most important goals (Baltes & Cartensen, 1999; Freund et al., 1999; Freund & Riediger, 2001). This may involve reorganizing their goal hierarchy into something that is more easily achieved. For example, people with a fear of falling whose balance is declining could start taking walks inside the mall where the floor is dry and level as opposed to an outdoor sidewalk that could be slippery or uneven.

Optimization allows individuals to pursue a higher level of functioning in a specific goal-related domain (Baltes & Baltes, 1990; Baltes & Cartensen, 1999; Freund et al., 1999; Freund & Riediger, 2001). First, people must focus their attention on participating in the most important goals. Then, they may seek to practice a previously learned skill so that the goal-related behavior is more manageable and the goal itself is more attainable. Optimization is an ongoing process as it requires persistence and time management. With optimization, individuals must recognize their current resources and come up with new ways to maximize those resources to achieve the goal. For example, people with a fear of falling may do leg exercises at home or go to the gym so that they have the strength to walk around in the community independently.

Compensation becomes necessary when an individual is no longer capable of maintaining the skills and behaviors that are required to reach his/her goals. Baltes and Cartensen (1999), Freund et al. (1999), and Freund and Riediger (2001) explain that this is different than selection and optimization because it occurs when individuals must find a way to compensate for the loss of abilities in order to achieve their original goals. When people experience a loss of behavioral abilities or skills that are necessary to achieve an important goal, they must find a way of meeting the goal, even if that means changing the way in which they go about achieving the goal. This often involves changing the way in which goal-directed behavior is performed as long as the original goal is still met. The use of external aids and even the help of other people would be considered compensation. For example, people with a fear of falling may use a cane for balance or have a friend assist them when they want to leave the house.

The extent to which people are able to use SOC is dependent on their effort and available resources (Freund & Baltes, 1998). Since resources (e.g., health, cognition) typically decline with age, researchers have found that older people display fewer SOC behaviors overall when compared with middle-aged people (Freund & Baltes, 2002). However, older adults who do continue to use SOC are higher functioning than those who do not use SOC (Baltes & Lang, 1997).

SOC has been applied in many different domains among people of all ages as a way to understand positive outcomes in situations where there are limited resources. In the context of work and family. Baltes and Heydens-Gahir (2003) discovered that individuals who reported using SOC strategies at work and at home experienced less stress and conflict in both domains. In a business setting, Yeung and Fung (2009) showed that older workers were more likely to report using SOC strategies than younger workers. Using these strategies at work allowed older adults to achieve better performance and be more productive than those who used fewer strategies. SOC has also been applied to the domain of disability management (Gignac, Cott, & Badley, 2002); specifically, these researchers investigated the ways that older adults adapted to osteoarthritis. The researchers found that nearly all participants reported using at least one SOC strategy to deal with their condition, which shows that older adults are able to use strategies to maximize normal functioning, even in illness and disability. However, older adults with more resources (e. g., cognitive resources, social resources) are better able to use SOC than those with fewer resources. It is clear that focusing attention on a few personalized goals (selection), working to achieve

those goals (optimization), and seeking outside assistance (compensation) are all effective ways of maintaining a high level of performance in a given domain.

Because SOC strategies are useful in helping the aging population achieve maximal functioning, SOC strategies are even more important for people who face additional challenges. One particular group that would benefit from the use of SOC strategies would be those with a fear of falling. Despite this obvious need, there has not been any research on how people with a fear of falling are using SOC.

Similarities between SOC Theory and Self-Efficacy in Managing Fear of Falling

Components of the SOC model are theoretically related to concepts such as falls self-efficacy that have been previously introduced in the falls intervention literature. Falls self-efficacy, which is a person's confidence in their ability to perform tasks without falling, has been shown to play a role in fear of falling. Li, Fisher, Hermer, McAuley, and Wilson (2003) showed that falls self-efficacy mediated the relationship between fear of falling (belief) and functional ability (behavior). According to Bandura's (1986) social cognitive theory, self-efficacy regulates the relationship between beliefs and behavior because it affects perceptions of capability when pursuing different activities. Experiencing success in a task (e.g., not falling) enhances or maintains feelings of self-efficacy whereas experiencing failure (falling) can diminish self-efficacy. When self-efficacy for a particular activity decreases, interest in an activity can decrease and, therefore, skills required to perform that task are lost (Bandura, 1989).

Researchers have speculated that self-efficacy plays an important role in managing fear of falling, so interventions have been developed to reduce fear of falling by increasing

falls self-efficacy. Unfortunately, reviews of such interventions have shown that few are successful (Jung, Lee, & Lee, 2009; Zijlstra et al., 2007). Interestingly, the few successful interventions all share a common theme; they share similarities with SOC theory (Cameron et al., 2000; Tennstedt et al., 1998; Zijlstra et al., 2009) because they incorporate behaviors that are involved in Selection, Optimization, and Compensation.

An in intervention by Tennstedt et al. (1998) involved goal setting. These researchers encouraged participants to set goals for increasing physical activity with the intention that experience and goal setting would reduce fear by improving self-efficacy. Goal setting is important because it helps people focus on what is important and help guide behavior (Center for Lifespan Psychology: Max Planck Institute for Human Development, 2004). Given what is known from social cognitive theory, accomplishing a goal should help improve self-efficacy, thus reducing fear (Bandura, 1986). Researchers in the Tennstedt et al. study helped participants set goals for increasing activity and encouraged participants to exercise at home. Although setting goals is also a part of Selection from SOC, Selection as a whole incorporates a larger array of behaviors such as organizing goals into a hierarchy, putting goals in context, and committing oneself to specific goals (Baltes, Baltes, Freund, & Lang, 1999). Therefore, the intervention is not actually using Selection because the researchers failed to mention whether the goals were unique to each participant or whether all participants were given the same goal. Therefore, there is no way of knowing if the participants actually perceived the goals as personally important and incorporated the goals into a hierarchy. Without specifically addressing this larger set of behaviors related to goals,

it is not surprising that the researchers did not find a change in fear of falling for people in the intervention group.

More recently, researchers have incorporated more Selection-type strategies to address the problems from the Tennstedt intervention and have experienced greater success. For example, as part of a fear of falling intervention, Zijlstra et al. (2009) helped participants set realistic and personalized goals for increasing physical activity. In addition to Selection-type strategies, this intervention also incorporated some Optimization-type strategies such as learning and practicing new skills. These researchers found that immediately after the 8-week intervention, participants in the intervention group had lower levels of fear of falling, less activity avoidance, fewer concerns about falling, and more daily activity than those in the non-intervention group. Fourteen months later, the intervention group still showed less fear than the non-intervention group, but they no longer exhibited differences in activity avoidance, concerns about falling, or daily activity. Clearly, the addition of more components of Selection, as well as some components of Optimization, aided this intervention. However, this intervention is not without its flaws. For instance, only about 58% of participants in the intervention group attended more than 5 sessions, which is interesting considering that all participants showed interest in participating in a fear of falling intervention. Additionally, the drop out rate in the intervention was approximately 10% higher than in the control group. Considering that older adults begin to lose interest and therefore lose the skills required to perform a task when self-efficacy is low (Bandura, 1989), it is not surprising that poor attendance and drop out rates were problems. It is possible that these problems stem from the fact that researchers failed to give participants

information on the importance of time allocation, focusing attention, and being persistent in accomplishing the goals for the intervention. Additionally, the researchers provided no instructions for how participants should adapt if they encountered a new barrier (e.g., injury).

Another type of intervention that has incorporated a component of SOC strategy is a hip protector study by Cameron et al. (2000). Participants in the intervention group wore hip protectors for two years while the control group did not. This is a Compensation-type strategy because it involves the use of external aids to counteract fear of falling. At follow up, researchers found that the hip protector group improved their level of falls self-efficacy whereas the control group reported worse falls self-efficacy.

Clearly, these interventions indicate that components of SOC theory are important for understanding fear of falling and self-efficacy. However, such interventions did not specifically consider behaviors associated with elective selection, loss-based selection, optimization, and compensation. A more thorough examination of such SOC-related behaviors might provide additional insights into the relationship between fear, self-efficacy, and activity level.

Present Study

This study tested if the use of SOC behaviors, in the domain of physical activity, mediated the relationship between fear of falling and activity level in older women. Using SOC, it was hypothesized that older women who used personalized SOC behaviors (i.e., those who select, optimize, and compensate) would have better outcomes when faced with limitations, would be more likely to maximize gains, and minimize losses. Therefore,

individuals who used SOC behaviors to maintain an active lifestyle should have been more successful at managing fear of falling. The researcher examined SOC behaviors for maintaining a physically active lifestyle to see if older women who reported more SOC use were more physically active. It was hypothesized that older women who participated in a greater number of SOC behaviors for maintaining physical activity would be more active than those who use fewer SOC strategies.

Goal 1: Examine the relationship between older women's fear of falling, activity level, and well-being. It was hypothesized that performing SOC behaviors would allow people to be more successful in a given domain (Baltes & Baltes, 1990). Therefore, people with a fear of falling who used a greater number of SOC behaviors to stay physically active were predicted to have higher falls self-efficacy (belief in ability to maintain balance) and be more physically active than those who were fearful but used fewer SOC behaviors (Figure 1). SOC behaviors would allow people with a fear of falling to select appropriate goals for themselves, optimize functioning to meet those goals, and use compensatory mechanisms in the face of barriers. People who use SOC behaviors also have a higher level of well-being than those who use few SOC strategies (Freund & Baltes, 2000; Wiese, Freund, & Baltes, 2000).

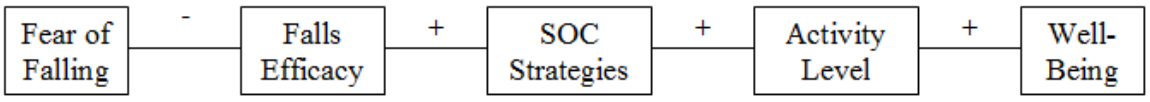

Figure 1. Proposed model for goal 1.

Goal 2: Explore alternative factors influencing SOC use and activity level. The purpose of this goal was to see if health, cognition, and age were responsible for SOC

strategy use. We expected that age differences may be present because older people have fewer cognitive resources than younger people (Park, 2000) and tend to have worse overall health compared with younger people (Anderson & Horvath, 2004; Roe, McNamara, & Motheral, 2002). Therefore, older people may be less likely to adopt SOC strategies to maintain an active lifestyle (Figure 2).

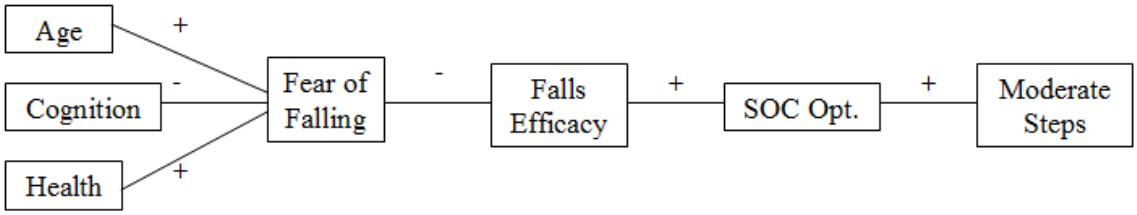

Figure 2. Proposed model for goal 2.

Goal 3: Explore the relationship between self-reported activity avoidance and physical activity. This study also examined how self-reported activity restriction relates to actual levels of physical activity. Researchers have shown that fear of falling is positively correlated with activity restriction (Lachman et al., 1998), however they have not shown that activity restriction actually involves a reduction in overall physical activity.

Methods

Participants

Eighty-eight older females participated in this study. A total of 6 participants dropped out immediately after the initial visit and did not complete any daily activity level data. Additionally, data from participants who did not complete at least 12 days of daily steps (n = 4), and participants whose mood scores met or surpassed the clinical cutoff for depression (n = 11), were dropped from the study. After accounting for participants who did

not meet the inclusion criteria, there were 67 participants available for data analysis. All participants were over the age of 65, able to walk, live independently, and not have a diagnosis of dementia. All participants were compensated $5 for their participation upon completion of the study.

Recruitment Plan. Participants were recruited through advertisements, posters, flyers, and presentations at various locations around Washington State. Specifically, participants were recruited from Whatcom county, Cowlitz county, and Snohomish county. These locations provided greater variability in SES and educational background of the participants. To find older adults with different levels of health, researchers recruited participants from senior centers, senior exercise classes, and senior living communities. During recruitment, researchers asked interested women if experiencing a fall was something they worried about at times. Only women who verbally self-identified as sometimes experiencing worry about falling down were accepted as participants.

Measures

The materials that are listed are in the order they appeared in the protocol.

Participant characteristics. Participant characteristics, which include: basic demographic information, mood, falls history, beliefs about falling, and speed of processing.

Demographics. Basic demographic information such as age, living situation, educational background, and daily cigarette intake was assessed using an interview format.

Mood. The Centers for Epidemiological Studies – Depression Scale (CES-D; Radloff, 1977) was used to assess feelings and behaviors related to depression to assure that groups did not differ on the basis of mood. This measure consisted of 20 multiple choice

items (e.g., “I am happy”) that assessed how the participant had felt or behaved in the past week (α = .84). Response options ranged from “rare or none of the time” (less than 1 day per week) to “all of the time” (5 – 7 days per week). Possible scores could range from 0 to 60 with high scores indicating higher levels of depression.

Falls Questionnaire. This questionnaire was used in order to understand falls history and the participants’ perceptions of falls. It was adapted from the Falling and Fear of Falling Questionnaire (Maki, 1997). This questionnaire also asked participants about their falls history (number of falls, time since last fall), perceived seriousness of the most recent fall (0 = Not at all serious, 3 = Very serious), injuries as a result of falls (1 = Yes, 0 = No), use of a walking aid (1 = Yes, 0 = No), how often they think and worry about falling (0 = Never, 4 = Always), are they afraid of falling (0 = Not at all, 3 = Very), are they more afraid since experiencing a fall (0 = Not at all, 3 = Very much), and are there any activities that have been restricted because they put participants at greater risk of a fall (1 = Yes, 0 = No). Participants were also prompted to specify what activities they had cut down on in an open response. Those responses were counted and given a numerical score to indicate how many activities participants have cut down on. Although no psychometric properties currently exist for this measure, it has been used in previous studies.

Speed of Processing. Cognitive function was assessed using the Digit Symbol Substitution Task (Wechsler, 1981). This was a 90 second test in which participants tried to substitute symbols for numbers in a list. There were nine symbols that correspond with nine digits. Participants had to place the appropriate symbol in the corresponding box in a quick

and accurate manner. The overall score was the number of correctly completed substitutions. Higher scores corresponded to better speed of processing.

Fear of Falling. The Survey of Activities and Fear of Falling in the Elderly (SAFE) (Lachman et al., 1998) is an 11-item questionnaire that was used to assess fear of falling (α = .91). The items reflected mobility, social activities, activities of daily living, and instrumental activities of daily living that are most commonly associated with a fear of falling (e.g., take a tub bath, go out when it is slippery, reach for something overhead). For each item, the participant was asked several additional questions which included: (a) Do you currently do the activity? (yes or no); (b) If you do the activity, when you do it how worried are you that you might fall? (0 = not at all worried, 1 = a little worried, 2 = somewhat worried, and 3 = very worried); (c) If you do not do the activity, do you not do it because you are worried that you might fall? (0 = not at all worried; 3 = very worried); (d) If you do not do the activity because of worry, are there also other reasons that you do not do it? (if yes, specify); (e) For those not worried, what are the reasons that you do not do it? (specify); (f) Compared to 5 years ago would you say that you do it (1 = more than you used to, 2 = about the same, or 3 = less than you used to). To measure fear of falling, the worry responses were averaged. The possible fear of falling score could range between 0 and 3 with higher scores indicating a higher level of fear. An activity restriction score was calculated for participants who reported any fear of falling (Deshpande, 2008). The fear-based activity restriction score was calculated by adding the number of activities that participants reported performing less often in the last 5 years or were not performed because of fear of falling. Based on these scores, three groups were created: scores of 0 were

classified as no activity restriction, scores between 1 – 2 were classified as moderate activity restriction, and scores of 3 or more were classified as severe activity restriction.

Falls Self-Efficacy. The Activities Specific Balance Scale (ABC: Powell & Myers, 1995) assessed fall related self-efficacy (α = .87). Participants indicated their level of confidence in performing each activity without losing their balance or becoming unsteady by choosing one of the percentage points on the scale from 0% (no confidence) to 100% (complete confidence). The 16 items on the scale each corresponded to a different activity. The activities included performing various ADLs as well as more difficult activities such as picking up an object from the floor or walking on icy sidewalks. The score was the average percentage of confidence for each person. Higher scores indicated greater falls self-efficacy.

Maintaining Physical Activity (SOC Strategy Use). The 24-item version of the original 48-item Selection Optimization Compensation (SOC) questionnaire (Baltes et al., 1999) was used in this study. There were four subscales of the measure (elective based selection, loss-based selection, optimization, and compensation), each of which contained 6-items. The format of the questionnaire was forced choice; participants read a target item (SOC strategy) and a distracter item (non-SOC strategy) and decided which of the opposing statements best described them. Each subscale has an acceptable alpha level: elective selection α = .95, loss-based selection α = .93, optimization α = .93, and compensation α = .92. As suggested by Baltes et al., the scale can be used in a domain specific fashion; in this study the domain was physical activity. The questionnaire included items such as “I always focus on the one most important goal at a given time” vs. “I am always working on several goals at once” for elective selection; “When things don’t work so well, I pursue my most

important goal first" vs. "When things don't go so well, I leave it at that" for loss-based selection; "I think about exactly how I can best realize my plans" vs. "I don't think long about how to realize my plans, I just try it" for optimization; and "When things don't work the way they used to, I look for other ways to achieve them" vs. "When things don't work the way they used to, I accept things the way they are" for compensation. Each subscale had an individual score which was the total number of SOC strategies chosen; scores could range from 0 to 6 with higher scores indicating greater strategy use. Additionally, a total SOC score was calculated by summing each subscale score; the composite score could range from 0 to 24 with higher scores indicating greater strategy use.

Well-Being. The environmental mastery scale of the Scales of Psychological Well-Being measure (Ryff, 1989) was used to measure well-being in relation to managing activities and the surrounding environment. The environmental mastery scale consisted of 14 items that measured participants' perceived ability to control the external world and master the environment ($\alpha = .86$). Positively scored items included statements such as "I am quite good at managing the many responsibilities of my daily life," and negatively scored items included statements such as "I find it stressful that I can't keep up with all of the things I have to do each day." Negative items were reverse scored so that high scores indicated high well-being. Responses ranged from 1 (strongly disagree) to 6 (strongly agree). Higher summed scores were indicative of greater well-being and show that the individual felt competent in the environment, utilized opportunities, and could make choices that controlled external activities.

Health. The functional health measure used by researchers in the Victoria Longitudinal Study was used in this study. The measure asked participants to indicate whether they had been diagnosed with any of 25 health conditions and provide the severity of each condition. Participants received a score of 0 if they did not have the illness, 1 if the illness was not serious, 2 if the illness was moderately serious, and 3 if the illness was very serious. These scores were summed to create a total health score. The number of medications currently taken and self-rated health compared to perfect (1 = very poor to 5 = excellent) was also be measured.

Daily Assessments. To measure daily activity, an Omron HJ-151 GOsmart Hip Pedometer was used. The pedometer measured the number of steps and moderate steps that were taken each day for 2 weeks. Steps included every single step that participants took; everything from shuffling to running was captured in this variable. Moderate steps were a measure of aerobic-activity steps. The pedometer automatically set the threshold for Moderate steps at a sustained pace of 120 steps per minute for at least 10 continuous minutes. Steps and moderate steps were recorded by participants every night in the daily assessment packet. This procedure was piloted in a study that was presented at the Gerontological Society of America conference (McDonald-Miszczak, Wise, Neupert, & Walsh, 2009). Participants did not experience any difficulty with the format of the daily assessment. Upon analyzing the data from the pilot study, it was clear that we needed to add a way to see what types of physical activities participants were doing because this would provide a better explanation of the number of daily steps. Therefore, participants were instructed to think about the top two activities they participated in each day that contributed

to a large percentage of their step count. Participants wrote down their top two activities and provided additional information about why they were participating in the activity (something they wanted to do, an obligation, or something they were obligated and wanted to do) and where they did it (an indoor activity they did at home, an indoor activity they did somewhere other than their home, and outdoor activity they did around their home, an outdoor activity they did somewhere other than their home). Participants also reported whether or not they were worried about falling during that activity and were also instructed to report if they experienced a fall during the study.

Follow-up Questionnaire. To better understand participants' activity level, a follow-up questionnaire was administered at the second visit. This questionnaire included 5 questions that included post-dictions of study performance and beliefs about personal activity level. Post-diction questions included items such as "in terms of my participation in the study (daily activity via the pedometer), I…" (was very motivated throughout, was somewhat motivated throughout, lost motivation as I participated, increased motivation as I participated, was not very motivated throughout). Beliefs about personal activity level included questions such as "which of the following categories best describes your typical level of physical activity?" (extremely active, somewhat active, somewhat sedentary, extremely sedentary). Each question was scored separately and reported in terms of frequency.

Procedure

Participants were informed of the nature and length of the study through promotional materials and presentations at senior centers throughout Washington State. After the

participant called the research lab to expresses interest, the researcher explained the study in more depth and asked participants if they had any additional questions or concerns. At that time, the researcher made an appointment for the first visit. Participants were visited in their home and completed the demographics questionnaire, mood questionnaire, falls questionnaire, Digit Symbol Substitution Task, SAFE, ABC, SOC questionnaire, the Scales of Psychological Well-Being environmental mastery scale, and health questionnaire.

At the end of the first session, participants were given instructions for what they would be doing for the next two weeks. First, they were given a pedometer to monitor the number of steps and moderate steps they would take over the two-week period. Participants were also given instructions on how to use the pedometers and how to record their daily steps and moderate steps. Participants were instructed to put on the pedometer in the morning when they woke and wear it throughout the day until they were ready to go to sleep. At that time, participants were to read the pedometer and record their daily activity level. In addition to the pedometer, participants were also asked to fill out a daily assessment for the two-week duration of the study. The daily assessment was filled out at the same time as the participant removed the pedometer for the night; the daily assessment was brief and should have taken approximately five minutes to complete. At an agreed upon date and time approximately two weeks later, the researcher returned to the participant's home and retrieved the pedometer and daily assessments. Personal performance data for the pedometer was made available to each participant if it was requested. A summary of the results were mailed to participants after the data was analyzed.

Statistical Analyses

A series of regression equations was used to analyze the first two goals.

Goal 1.

Equation 1.

Falls Efficacy = Constant + Fear of Falling

Equation 2.

SOC = Constant + Fear of Falling + Falls Efficacy

Equation 3.

Activity Level = Constant + Fear of Falling + Falls Efficacy + SOC

Equation 4.

Well-Being = Constant + Fear of Falling + Falls Efficacy + SOC + Activity Level

Goal 2. A similar series of regression equations was used to analyze the second goal. The main difference was that an equation was added to the beginning of this series to control for demographic variables. This equation used Age, Health, and Cognition to predict Fear of Falling.

Results

Participant Characteristics

Demographics and General Health. Participants were 67 females between the ages of 65 and 98 (see Table 1), 39 of whom lived alone. Seventy percent of the sample had at least some college education and all participants had a minimum of high school education. Overall, participants were in good health with 57 rating their health as good or excellent, and

only three needing help with an ADL. On average, participants took 4.7 prescription medications per day. All but 7 participants reported that their activity level was the same as or higher than other people their same age. When asked about how physically active they are in general, most participants reported that they were somewhat active (n = 40) or extremely active (n = 17). Additionally, only 5 participants reported that physical activity was difficult; all other participants reported that physical activity was easy (n = 36) or very easy (n = 26).

Mobility and Falling. Nineteen participants reported using a walking aid, such as a cane or walker. When asked how often they think about falling, 55 participants reported that they think about falling to some degree. When asked how often they worried about falling, 44 participants reported some degree of worry about falling. When asked if they were afraid of falling, 45 participants reported some degree of fear of falling. When fear of falling was measured in the SAFE, participants' level of fear of falling was slightly lower than that of female participants in a previous study (M = .40 out of 3; Talley, Wyman, & Gross, 2008). Over 80% of participants had experienced a fall during the last year. Of the women who had fallen, all but eight had experienced a fall in the last 5 years. Only 13 participants rated their most recent fall as serious or very serious. Yet, over two thirds of participants had experienced an injury because of a fall. Of the participants who had experienced a fall and reported some degree of fear of falling (n = 39), all but 6 participants reported that they were currently more afraid of falling now than they were before they ever experienced a fall. Thirty-one participants reported that they had cut down on one or more activities because the activity would put them at greater risk for a fall. Over the 2-week course of the study,

two participants experienced a fall. See Table 2 for descriptive statistics for variables of interest. See Tables 1, 2, and 3 for descriptive statistics and correlations.

Table 1.

Descriptives for Participant Characteristics

Variable	*M* (*SD*)
Age	80.39 (8.73)
Years of Education	15.05 (2.83)
Depression	5.84 (4.58)
Speed of Processing	40.11 (11.65)
Number of Falls	4.55 (7.53)
Length of Time Since Last Fall	2.61 (3.62)
Number of Medical Conditions	3.51 (2.07)
Seriousness of Each Medical Condition	1.40 (.48)
Number of Medications	4.72 (3.04)
Self-Reported Health	3.99 (.73)
Self-Reported Activity Level	3.74 (.97)
Ease of Physical Activity	3.34 (.69)

Note. Length of time since last fall was measured in number of years. Seriousness of each medical condition had three different responses ranging from 1 (not serious) to 3 (very serious). Self-reported health was measured on a scale from 1 to 5 (1 = very poor, 5 = excellent). Self-reported activity level is a comparison of personal activity level to typical seniors in the community (1 = significantly below average, 5 = significantly above average). Ease of physical activity over the course of the study was measured on a 4-point scale (1 = very difficult, 4 = very easy).

Table 2.

Descriptives for Variables of Interest

Variable	*M* (*SD*)
Fear of Falling	.33 (.31)
Falls Efficacy	74.68 (19.20)
SOC Total Strategies	16.15 (4.21)
Elective Selection	3.57 (1.74)
Loss-Based Selection	4.48 (1.16)
Optimization	4.13 1.43)
Compensation	3.97 (1.88)
Steps	3337.85 (2329.62)
Moderate Steps	637.85 (1146.89)
Well-Being	71.85 (8.32)

Note. Possible scores on variables of interest: scores for fear of falling could fall between 0 (not afraid) and 3 (very afraid), scores for the falls efficacy measure could fall between 0 (not at all confident in balance) to 1600 (extremely confident in balance), and scores for well-being could fall between 0 (low well-being) to 84 (high well-being). The SOC total strategies is the sum of the subscale scores; scores on the subscales could fall between 0 (no SOC strategy use) to 6 (high SOC strategy use) Steps is the average number of daily steps taken. Moderate steps is the sum of daily aerobic activity steps divided by the number of days when moderate steps occurred.

Table 3.

Correlation Matrix for Variables of Interest

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Fear of Falling	-	-.51**	.22	.20	.12	.09	.16	-.08	-.04	-.10
2. Falls Efficacy		-	.03	-.36**	.06	.22	.20	.46**	.30*	.28*
3. Total Soc Strategies			-	.63**	.63**	.76**	.70**	.11	.17	.10
4. Selection (Elective)				-	.43**	.20	.06	-.07	-.02	-.04
5. Selection (Loss)					-	.33**	.15	.18	.23	.02
6. Optimization						-	.56**	.17	.30*	.20
7. Compensation							-	.07	.03	.09
8. Steps								-	.72**	.21
9. Moderate Steps									-	.17
10. Well-Being										-

Note. * denotes $p < .05$, ** denotes $p < .01$.

Goal 1: Examine the relationship between older women's fear of falling, activity level, and well-being. In order to examine the first goal of this study, a regression analysis was used to determine if the number of SOC behaviors mediated the relationship between fear of falling and activity level. Activity level was measured two different ways (Steps & Moderate Steps), so separate regression analyses[1] were conducted for each variable. The first regression analysis was performed with fear of falling significantly predicting Falls Self-Efficacy ($\beta = -.51$, $p < .01$), Falls Self-Efficacy significantly predicting SOC Total strategies ($\beta = .31$, $p < .05$), SOC Total Strategies did not significantly predict Steps ($\beta = .05$, $p = .66$), and Steps did not significantly predict Well-Being ($\beta = .09$, $p = .66$). When the analysis was repeated using Moderate Steps, the results were virtually identical (Figure 1).

[1] A path analysis was originally planned to test the models but there were fewer participants than expected, so regression analyses were conducted.

SOC Total strategies did not significantly predict Moderate Steps (β = .13, p = .28), and Moderate Steps did not significantly predict Well-Being (β = .07, p = .58). Since neither form of activity level measure was a good predictor of Well-Being, Well-Being was removed from the model in all subsequent analyses.

Because a composite score was used for SOC Total strategies, additional regression analyses were performed for the separate SOC subscales (Elective Selection, Loss-Based Selection, Optimization, Compensation). SOC Optimization was the only variable to approach significance (β = .21, p = .08) as a predictor for Moderate Steps.

Goal 2: Explore alternative factors influencing SOC use and activity level. To examine the second goal, a regression analysis was conducted that controlled for Age, Health, and Cognition in the relationship between SOC Optimization strategies and activity level (Figure 3). Health was the only significant predictor of Fear of Falling (β = .49, p < .001), Fear of Falling significantly predicted Falls Efficacy (β = -.33, p < .01), Falls Efficacy significantly predicted SOC Optimization (β = .52, p < .01), and SOC Optimization significantly predicted Moderate Steps (β = .27, p <.05).

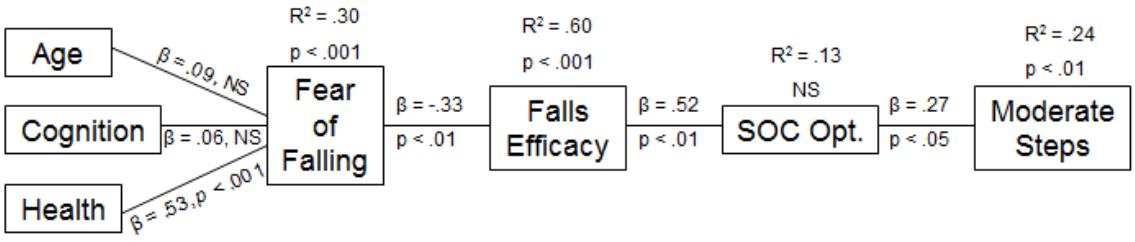

Figure 3. Results of the regression analysis for Goal 2.

Upon re-examination of the SOC Optimization scale, it was clear that another variable could be playing a part in this relationship. When Mood was added as an

independent variable in the regression analysis, R^2 approached significance when SOC Optimization was the dependent variable (Figure 4).

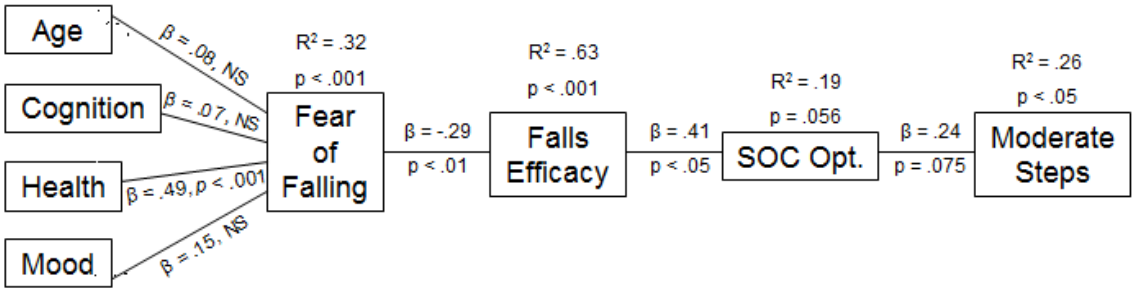

Figure 4. Results of the regression analysis for Goal 2 with Mood.

Goal 3: Explore the relationship between self-reported activity avoidance and physical activity. A Pearson correlation between Fear-Based Activity Restriction (Severe Activity Restriction = 3+ activities [n = 19], Moderate Activity Restriction = 1-2 activities [n = 28], No Activity Restriction = 0 activities [n = 20]) and physical activity level (Steps and Moderate Steps) was conducted. Fear-Based Activity Restriction resulted in a statistically significant correlation with Steps (r = -.35, p < .01) and Moderate Steps (r = -.27, p < .05). A one-way between-subjects ANOVA found an effect of Fear-Based Activity Restriction on Steps F (2, 64) = 6.04, p < .05, η^2 = .16. Tukey's HSD comparisons found that participants who engaged in severe activity restriction took fewer steps (M = 2072.66, SD = 1038.40) than participants who did not engage in activity restriction (M = 4487.61, SD = 2394.03). A one-way between-subjects ANOVA found an effect of Fear-Based Activity Restriction on Moderate Steps, F (2, 64) = 3.25, p < .05, η^2 = .09. Tukey's HSD comparisons found that participants who engaged in severe activity restriction (M = 361.47, SD = 1212.13) took fewer moderate steps than participants who did not engage in activity

restriction (M = 10915.80, SD = 19048.69) ($p < .05$). See Figures 5 and 6 for histograms of mean activity level at each level of activity restriction.

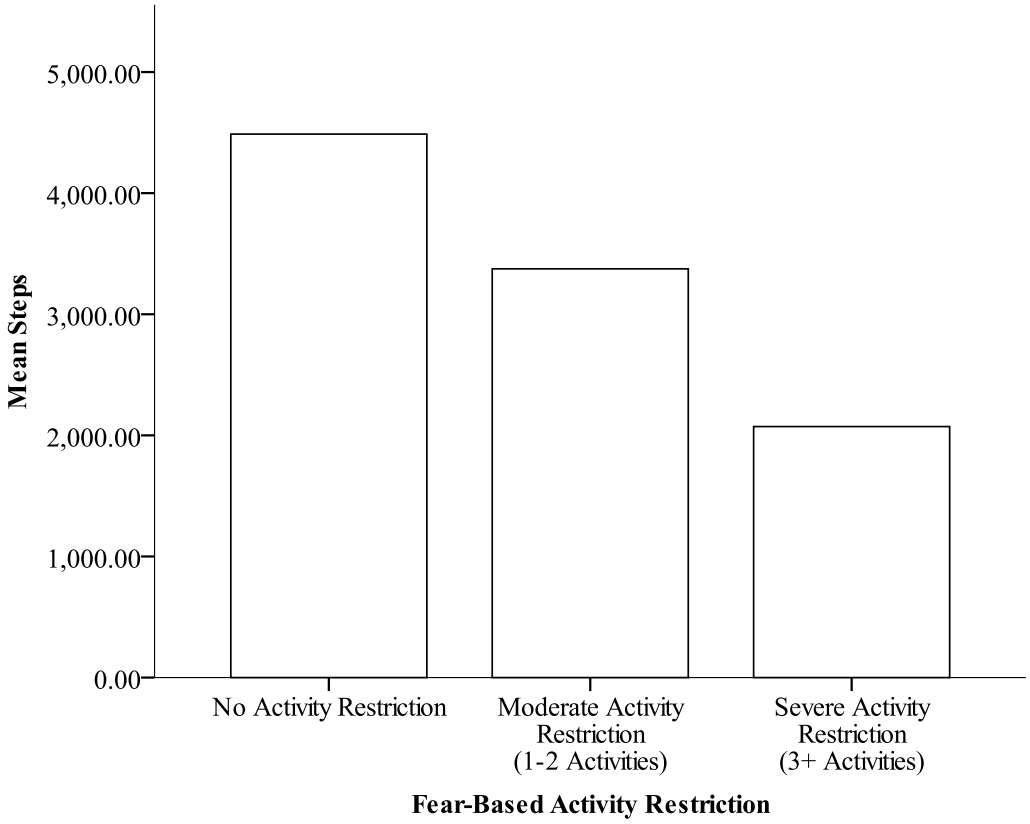

Figure 5. Mean number of steps taken at each level of activity restriction.

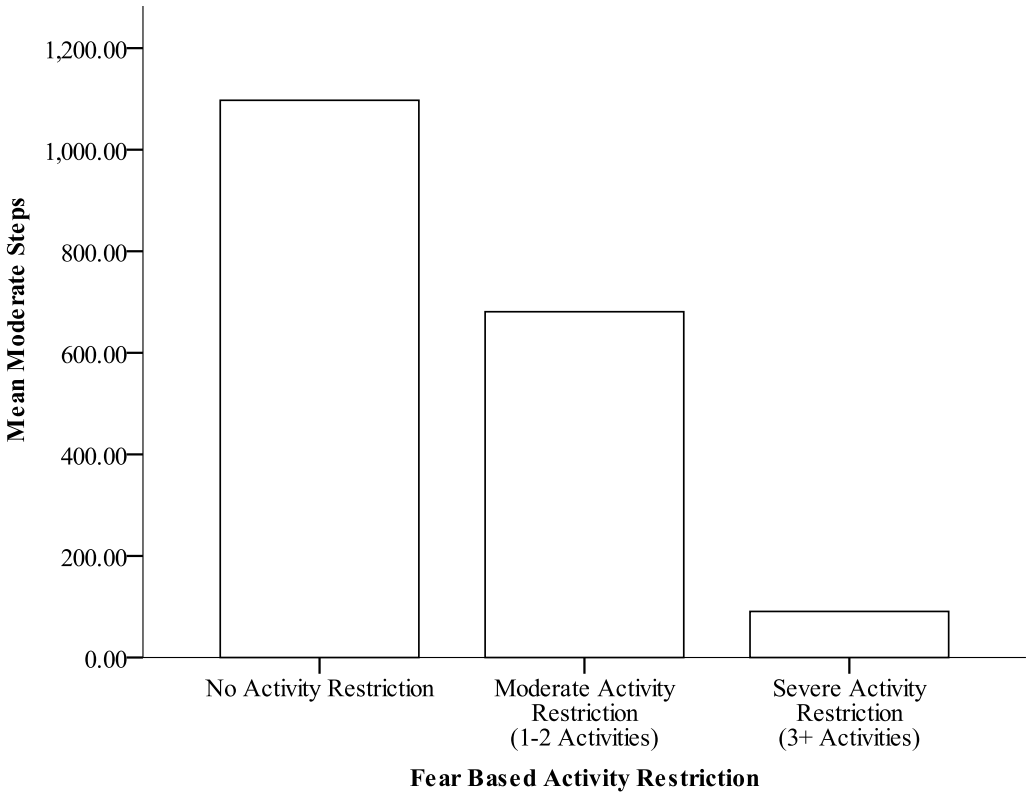

Figure 6. Mean number of moderate steps taken at each level of activity restriction.

Discussion

Main Findings

Goal 1: Examine the relationship between older women's fear of falling, activity level, and well-being. The overall goal of the study was to explore the relationship between fear of falling, SOC strategies, activity level, and well-being. Two separate regression equations were conducted examining Steps and Moderate Steps separately. As expected, individuals with lower Fear of Falling had higher levels of Falls Self-Efficacy (indicating more perceived stability), and also used more SOC Total strategies. This finding points to

the important role that beliefs (fear of falling) play in behavior (using SOC strategies), which supports Bandura's (1986) social cognitive theory.

However, the remainder of the findings from Goal 1 were inconsistent with the original expectations. SOC Total strategies were not a good predictor of Steps or Moderate steps. It is possible that the SOC Total strategies variable incorporated too wide of a variety of strategies to be used as a single variable as SOC Total strategies incorporated Elective Selection, Loss-Based Selection, Optimization, and Compensation subscale scores. Using a variable which was composed of subscale scores could be problematic because it may minimize variation present between the SOC subscales. For example, a participant who reported using a high level of Loss-Based Selection but no Optimization would have the same SOC Total score as a participant who reported using a high level of Optimization but no Loss-Based Selection. Despite the fact that these participants would have the same score, there is obviously a difference between these two participants. The difference which causes participants to answer the SOC questionnaire differently may be their level of functioning. Ziegelmann and Lippke (2007) explain that Elective Selection and Optimization are more general because people who are high or low functioning can utilize these strategies for physical activity. Loss-based selection and compensation imply that the individual is responding to a loss in terms of achieving physical activities, which makes it more likely that higher functioning people would not report that they use these strategies. Therefore, it may be better to examine the SOC subscales separately.

Additionally, neither activity variable predicted Well-Being. Well-Being may not have worked well as a final variable in the model because most participants reported high

levels of Well-Being (M = 71.8, highest possible score was 84), which means there was little variation in well-being scores. This finding is supported by previous research which showed that older adults have higher levels of environmental mastery Well-Being than younger adults (Ryff, 1989). Another potential reason why the well-being variable didn't work in the model was because of the measure used. The environmental mastery subscale of the Scales of Psychological Well-Being (Ryff, 1989) was used in this study because it provided a measure of well-being in relation to managing activities and the surrounding environment. Although this measure contained questions that were related to staying active, there were also questions that had to do with finances, personal responsibilities, living situation, and relationships. It makes sense that activity level was not a good predictor of Well-Being because the measure contained so much extraneous information. In addition, Well-Being may not have worked because older adults who view physical activity as less important may experience greater Well-Being than those who place higher value on physical activity but experience limitations (Rejeski & Mihalko, 2001).

There were no significant correlations between SOC Total strategies, Steps, Moderate Steps, or Well-Being (see Table 3). It is interesting that there was no relationship present between SOC, activity level, and Well-Being because previous research has demonstrated that using SOC-type strategies is related to higher levels of well-being (Freund & Baltes, 2002). Considering the results of previous research have shown that people who use SOC strategies exhibit higher levels of functioning than people who do not use SOC strategies (Baltes & Lang, 1997), SOC strategies should be able to predict activity level. However, as was mentioned earlier, SOC total strategies may not be an appropriate variable

to use because it is made up of subscale scores. Since different subscales are related to lower levels of physical functioning (Ziegelmann & Lippke, 2007), participants who scored high in Loss-Based Selection or Compensation may not have been able to be as physically active as participants with similar SOC total scores who score high in Elective Selection or Optimization.

To further investigate the relationship between SOC and activity level, the model was re-examined using each of the separate SOC subscale scores. The use of separate SOC subscale scores is justified because each can be understood as separate processes which uniquely contributes to successful aging (Freund & Baltes, 1998). Other researchers have used this technique and have found that different strategies emerge as more useful in different situations. For example, Yeung and Fung (2009) found that compensation predicted job performance and elective selection predicted sales productivity. In a different study, Gignac et al. (2002) found that older women are most likely to use compensation and optimization to manage disability. Therefore, analyzing SOC subscales separately may provide more clarity in the relationship between SOC and activity level in this study.

When the separate SOC subscales and activity level variables were analyzed in a correlation matrix (table 3), the only variables which showed a notable correlation were SOC Optimization and Moderate Steps. SOC Optimization may have emerged as the most useful SOC strategy because it involves time, energy, effort, and persistence (Baltes & Heydens-Gahir, 2003). Additionally, SOC Optimization has been found to be a means by which older adults improve their mobility, which allows them to maintain an adequate level of physical function (Gignac et al., 2002). Moderate steps may have emerged as the most

useful physical activity variable because they require a great deal of perseverance; Moderate Steps are not something that everyone can easily achieve. Since people with a fear of falling tend to walk slower and are generally weaker than those with less fear (Brouwer, Mussleman, & Culham, 2004), using a measure of more strenuous physical activity makes it easier to identify those who engage in more physically demanding tasks. Thus, it makes sense why Optimization and Moderate Steps emerged in the model.

Goal 2: Explore alternative factors influencing SOC use and activity level. The next step in the analyses was to see if the addition of variables like Age, Cognition, and Health (i.e., resources) would clarify the relationship in the hypothesized model. Because older adults typically have poorer health and fewer cognitive resources than younger people (Anderson & Horvath, 2004; Roe et al., 2002; Park, 2000), it was expected that age, health, and cognition may affect fear of falling, falls self-efficacy, and SOC strategy use. Participants who were in worse health had higher levels of fear of falling. Additionally, participants with lower levels of fear of falling had higher levels of falls self-efficacy. However, the overall model becomes non-significant once SOC Optimization was added. Despite this finding, the significant pathways show that participants with high falls self-efficacy tended to use a greater number of SOC Optimization strategies and those who used more SOC Optimization took more moderate steps.

Upon closer inspection of the correlations, it was clear that mood plays an important role in SOC Optimization. An analysis of variance supported this claim by showing that participants who were clinically depressed used significantly fewer SOC Optimization strategies than people who were not clinically depressed. This finding is supported by

previous research found that older adults' ability to utilize SOC is dependent on mood (Weiland, Dammermann, & Stoppe, in press). Considering some of the symptoms of depression (feelings of helplessness/hopelessness, loss of interest in daily activities, loss of energy), it would be difficult for a person who exhibits symptoms of depression to engage in SOC Optimization. Therefore, it is clear that SOC Optimization is influenced by mood.

Mood was added to the first step of the regression equation, but it was not a significant predictor of fear of falling. Additionally, Mood did not change the relationship between fear of falling and falls self-efficacy, as fear of falling remained a significant predictor of falls self-efficacy. However, Mood did change the next step in the equation; participants who had high levels of Falls Self-Efficacy also had higher SOC Optimization use. Finally, participants with high SOC Optimization use seem to take more Moderate Steps despite the fact that the final pathway did not quite reach significance.

Although the addition of demographic variables in the regression equation strengthened the relationship between the subsequent variables, we were not able to include all demographic variables that might influence the variables used. For example, it is possible that living situation might also influence fear of falling, yet it was not included in the analyses. In the future, researchers should explore additional demographic variables that could help strengthen the overall model.

Goal 3: Explore the relationship between self-reported activity avoidance and physical activity. The purpose of the analyses for the third goal was to explore the relationship between fear-related activity avoidance and actual physical activity. Previous studies have shown that fear of falling leads to more activity restriction (Lachman et al.,

1998) and that activity restriction leads to deconditioning (Maki et al., 1991) and worse performance during physical activity (Delbaere et al., 2004). Despite these findings, researchers have not directly shown that activity restriction involves a reduction in daily physical activity. The findings from this study support the original hypothesis and extend previous research because they show that participants who engaged in self-reported fear-based activity restriction took fewer steps and fewer moderate steps than those who did not engage in fear-based activity restriction. This information is useful for future researchers because it helps explain why fear of falling leads to worse performance on physical tasks.

Limitations & Future Directions

The largest limitation of this study was the small sample size. Recruitment was more difficult than initially expected; a major factor that played into this was the duration of the study. Upon hearing that participation required two weeks, even though it did not disrupt daily routine, many women became disinterested and said they were too busy. It is interesting that the length of the study was problematic as the researcher had used this procedure in pilot studies without problem. Another major barrier to recruitment, and accuracy in the results, was that many women were very hesitant to agree that they sometimes worried about falling. Some women would explain that they did not worry, they just did not do things that would cause them to worry about falling (i.e., do not use stairs, do not go outside). Therefore, it seems as though older women who have some worries about falling in specific situations may be missing from this sample.

There was also quite a high incidence of depression in this sample. There may have been a higher than normal incidence of depression in this sample because the sample was

made up of older women who identified as being worried about falling. An analysis of variance showed that clinically depressed participants may have slightly higher levels of fear of falling than non-depressed participants. This finding is supported by previous research which demonstrated that older adults who have higher levels of fear of falling also report more depressive symptoms (Chou, Yeung, & Wong, 2005). Therefore, the fact that the sample consisted solely of people with a fear of falling may have been the reason why there were so many clinically depressed participants.

Due to the small sample size, a regression analysis was used to test the model instead of a path analysis. Regression analyses do not account for intercorrelations between predictors, only a direct path from the predictor variables to the dependant variable. Although this type of analysis provides useful information and is conceptually very similar to path analysis, it does not provide an entirely accurate picture of the relationships between the predictor variables. For example, previous research has shown that there is a relationship between resources (e.g., age, cognition, health, mood) and SOC strategy use (Freund & Baltes, 1998), yet the proposed model did not allow for a direct path between resources (Mood, Health, Age, Cognition) and SOC strategies. Specifically, the need for a direct path between Mood and SOC Optimization is critical because data from the current study shows that there is a correlation between Mood and SOC Optimization. A direct pathway may also be necessary between SOC strategies and Well-being as researchers have demonstrated that high SOC use has a strong positive correlation with well-being (Freund & Baltes, 2002). Therefore, a larger sample size would allow the model to include the previously mentioned intercorrelations, which would strengthen the overall fit of the model.

In the future, many of these limitations could be answered by replicating this study and using the same experimental design but with an increased sample size which would allow for additional correlations to be added to the model.

Another limitation in this study was the potential underestimation of fear of falling. The SAFE was used to measure fear of falling because it measured fear in regards to everyday tasks that require mobility. The SAFE also provides a fear-based activity restriction score, which was critical for assessing Goal 3. This measure had good reliability and had been used in many previous studies, however it is not without problems. As other researchers had noted (Talley et al., 2008), the language used in the SAFE may be problematic because it involved the term "worry." The term "worry" may insinuate a higher level of apprehension than participants actually felt. During completion of the SAFE, participants remarked that they were "cautious" and "more careful" but had a much more difficult time stating they were worried. Additionally, the everyday tasks mentioned in the SAFE may not have been challenging enough for some of our younger or more high-functioning participants. The activities included in the SAFE are the top 11 activities in which older adults report a fear of falling. The SAFE activities include things such as getting out of bed, going to the store, and preparing meals which did not seem like particularly challenging tasks for active older women. In the future, a more sensitive measure is needed for fear of falling because it would provide greater variability in fear scores.

The SOC questionnaire (Baltes et al., 1999) is a practical measure of SOC strategies because it is able to be used in a domain specific fashion. However, this strength ended up being problematic because of the domain chosen. Physical activity was chosen as the

domain because it can consist of many different activities that involve walking. However, the problem with using physical activity as the domain is that it is a very general term and does not mean the same thing to everyone. For instance, some participants seemed to have difficulty understanding what constituted physical activity because they did not necessarily see some of their daily activities (e.g., housekeeping, gardening) as physical activities, yet others did. For some of the more sedentary participants, physical activity included very few activities (e.g., making the bed, walking in the house); for others, there were simply too many different types of physical activities to choose from. Additionally, some participants reported that they were unsure of the correct answer because their answer would vary depending on which specific physical activity they happened to be thinking about. In future research, it may be better to frame the domain of the questionnaire in a way that made participants think about tasks that involve walking specifically.

Another potential limitation of this study was that it took place during the time of year when the weather is worst in the Pacific Northwest. This is problematic for a study that tracks participants' activity level because when the weather is bad, people are less willing to engage in outdoor activities. Many participants verbally reported that they walked less during this study than they normally do because of snow or heavy rain. Since moderate steps are very difficult to achieve indoors (unless the person is on a treadmill or mall walking), we may have seen participants engage in more moderate steps during the summer months when they were able to walk outdoors. Regular steps may have also been underestimated due to bad weather because participants were not leaving their houses on days when there was snow. There is also evidence that other variables such as fear of falling, falls self-efficacy,

and mood may have been affected by weather as well. In this study, participants reported the highest levels of fear of falling for going outside when it is slippery, and lowest levels of falls self-efficacy for walking outside on icy sidewalks; both of which were weather conditions that commonly occurred over the course of this study. Mood may have also been influenced as women experience higher levels of depression in the winter than in the summer (Harmatz et al., 2000). In the future, researchers should replicate this study during the summer months to check if there was a substantial change in any of the key variables.

Conclusion

This study demonstrates that older women may be able to manage their fear of falling by incorporating SOC Optimization strategies when making plans to engage in physical activity. SOC Optimization strategies, which revolve around practice and persistence, are helpful when a task is more physically demanding and requires more resources. Older adults need SOC Optimization strategies to partake in physically demanding tasks because these types of tasks require perseverance to complete. However, this relationship seems to be mood dependent. If older adults exhibit depressive symptoms, they do not use as many SOC Optimization strategies as those with lower levels of depressive symptoms. These results are interesting in that they provide falls interventions researchers with new information that may be helpful in creating more successful fear of falling interventions. This study also demonstrated that older women who engaged in fear-based activity restriction took fewer steps and fewer moderate steps than those who did not engage in activity restriction. This link between activity restriction and actual activity level

provides information that helps explain why fear of falling leads to worse performance on physical tasks.

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