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Careful, not fearful: A mixed methods study to investigate fall-risk appraisal and fear of falling in community-dwelling older adults

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CAREFUL, NOT FEARFUL: A MIXED METHODS STUDY TO INVESTIGATE THE APPRAISAL OF FALL-RISK AND FEAR OF FALLING IN COMMUNITY-DWELLING OLDER ADULTS

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Abstract

This study investigated older adult's accuracy in fall-risk judgement and ascertained whether fall-risk appraisal was situation specific or general in nature. Convenience and snowball sampling were used to recruit 30 community-dwelling older adults aged 65 years and older. An embedded correlational mixed methods was utilized to investigate relative and absolute fall-risk judgement, balance confidence, and hazard identification. Using Pearson Product Moment correlations, multiple regressions, and qualitative analysis, the findings suggest older adults are not always accurate in appraising fall-risk. Judgements were specific and not general in nature, as only 9.30% of variance in risk appraisals and 12.96% of variance in balance confidence were general across four fall-related scenarios. Both absolute fall-risk and balance confidence judgements were not strongly predicted by physical ability, as measured by the Timed-Up-and-Go and Functional Reach tests. The number of hazards identified in each scenario was not strongly correlated to fall-risk appraisal or balance confidence, rather often focused on a single hazard in the scenario being assessed. The inaccuracies of appraisal of fall-risk suggest the importance of specific fall prevention training addressing the subjective appraisals made by older adults relevant to their circumstances.

Keywords: fall-risk, risk, appraisal, judgement, fear of falling, older adults

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Chapter 1: Introduction

Falls are the second leading cause of accidental death worldwide with an annual total of 424 000 deaths (WHO, 2012). Falls have been found to occur in one third of older adults 65 years of age and older. This rate increases to nearly half in those 80 years of age and older (CDC, 2013). Additionally, fall-related injuries are five times more likely to occur in older adults greater than 65 years of age (Public Health Agency of Canada, 2005). Falls have been found to be the leading cause of both non-fatal (i.e., bruises, lacerations) and fatal (i.e., traumatic brain injuries, death) injuries in older adults (CDC, 2013). Falls are a major public health problem with many potential negative consequences for older adults. Thus it is only natural that a fear of falling may be equally prevalent to falls and has been found in 26% to 79% of older adults (Arfken, Lach, Birge, & Miller, 1994; Gaxatte et al., 2011; Howland et al, 1993; Lach, 2005; Murphy, William, & Gill, 2002; Powell & Myers, 1995; Suzuki, Ohyama, Yamada, Kanamori, 2002; Zijlstra et al., 2007).

By the year 2031, the Baby Boom population in Canada (those born from 1946 to 1965) will be 65 years of age and older. As the Baby Boomers reach the age of 65 years and older the proportion of older adults in Canada will reach 23% of the Canadian population, up from the 11% of the population found in the 2011 Census (Statistics Canada, 2011). Therefore, "Canada, like many other countries, is aging" (Chappell & Hollander, 2013, p 1). Life expectancy of Canadians has increased from 76 years of age in 1981 to 81 years in 2006 (Chappell & Hollander, 2013). These trends indicate a need to shift research and the consumers of health care's focus on the increased number of older adults in order to decrease the potential financial burden on the health care system that is already over burdened. However, there is a question of what comes first, fear of falling or falling then fear? Many

potential consequences may occur both before and after a fall especially with increasing age. Future research on fear of falling should be expanded to incorporate appraisals of fall-risk to investigate how older adults appraise fall-risk that affects their subsequent behaviour. As a result, enhanced fall prevention strategies and understanding of older adult's appraisal of risk can be developed to encourage proactive rather than reactive care

Fear and Fear of Falling

A fear of falling has been defined as a preoccupation about falling that may lead one to avoid activities older adults are able to still perform (Tinetti, Speechley, & Ginter, 1988; Tinetti & Powell, 1993). A fear of falling has also been associated with low balance confidence (Myers et al., 1996), and low falls efficacy (Cumming, Salkeld, Thomas, & Szonyi, 2000). Specifically, a fear of falling has three main components: physiological (i.e., increased autonomic reactivity); behavioural (i.e., walking slowly to prevent a fall); and a cognitive component (i.e., a subjective estimate of the level of risk and one's ability to avoid a fall) (Hadjistavropoulos, Delbaere, Fitzgerald, 2011). There may be an association between recent falls and fear of falling since they are interrelated concerns that have varying perceived consequences to each individual (Boyd & Stevens, 2009; Friedman, Munoz, West, Rubin, & Fried, 2002). In addition, a fear of falling has been found to be greater in those older in age, those with a history of falls, and those who are female (Friedman, et al., 2002; Howland et al., 1998; Lach, 2005; Murphy, et al., 2002; Suzuki, et al., 2002; Zijlstra et al., 2007).

Fear of falling is a complex construct, thought to predominately affect older adults. However, not everyone who falls develops a fear of falling and people who have not fallen may be fearful even though it is commonly assumed that falls and fear are conflated

(Cumming, et al., 2000; Painter et al., 2012; Yardley & Smith, 2002). Fear is a multifaceted phenomenon involving characteristics of apprehension, tense expectation for the worst, worrying, and perceived helplessness due to potential risks (Kretitler, 2004). Specifically, fear can be an indication of a realistic appraisal of the potential risks involved in activities. Individuals found to be fearful focus "…on sensations, feelings and evaluations, that represent the internal sphere, coupled with focusing on different aspects of external reality, such as location, size, objects involved in the situation, while overlooking other aspects, mainly functions, consequences and temporal cues" (Kreitler, 2004, p. 8).

Falls carry a psychological price otherwise known as a fear of falling, which can be a common phenomenon among older adults as found in the research literature (Brouwer, Musselman, & Culham, 2004; Jorstad, Hauer, Becker, & Lamb, 2005; Murphy, et al., 2002). While physical health declines with age, subjective health (psychological and emotional health) may not decline in the same manner (Chappell & Hollander, 2013). This unbalance of objective and subjective health may present the opportunity for misappraisal of fall-risk in older adults. Accordingly, older adults' perceptions of risk of falling may affect their actions to prevent future falls and impact subsequent behaviour (Horton, 2007). Risk decisions with both cognitive and emotional appraisal highlight the complexity of the decision-making process in situations of risk.

Methods of Measurement of Fear of Falling

The selection of a fear of falling measurement may affect conclusions that can be drawn about its relationship to fall-related behaviour. It is important for the construct being researched to correspond with the construct measured in the fear of falling research (Jorstad et al., 2005). For example, the lack of uniformity of the strategies used to measure fear of

falling has contributed to the great variation in the reported prevalence of fear of falling ranging from 26% to 79% throughout the literature (Arfken, et al., 1994; Gaxatte, et al., 2011; Howland et al, 1993; Lach, 2005; Murphy et al., 2002; Powell & Myers, 1995; Suzuki et al., 2002).

Researchers have been found to predominately measure fear of falling using a single question asking whether or not a person was afraid of falling using a graded scale from very fearful, somewhat fearful, and not fearful or a dichotomous yes/no answer (Arfken et al., 1994; Friedman et al., 2002; Lach, 2005; Lachman et al., 1998; Murphy et al., 2002; Suzuki et al., 2002). Other measures have been found to focus on self-efficacy, which have typically been measured through the Falls Efficacy Scale (FES), Activities-Specific Balance Confidence Scale (ABC), and the Survey of Activities and Fear of Falling in Elderly (SAFE) (Lachman et al., 1998; Myers et al., 1996; Tinetti & Powell, 1993). In the FES, respondents are asked to use a 10-point scale to identify how confident they felt about performing an activity without falling (Tinetti & Powel, 1993). The ABC scale has been used for seniors with higher functional levels where measures of activities of daily living outside the home are used on a 16-item scale (Myers et al., 1996). Myers et al. (1996) suggested that the ABC scale had greater item specificity and activity difficulty than the FES. The SAFE scale quantifies fear of falling and activity restriction using 11 activities performed inside and outside the home without help from others (Lachman et al., 1998).

The aforementioned scales measure self-efficacy in older adults in various circumstances specified in the measurement scales. However, it is important to consider what constructs are being measured with fear of falling in each particular study. For instance, the impact of using a total score from ABC or FES diminishes the understanding of behaviour and self-regulation in specific situations (Brouwer et al., 2004; Cumming et al., 2000;

Howland et al., 1998; Myers et al., 1996). While studies may have suggested that the single item question, 'are you afraid of falling' is not correlated with actual balance and mobility measures or has limitations due to its dichotomous or categorical nature, that it is not associated with physical performance (Allison, Painter, Emory, Whitehurst, & Raby, 2013; Lach, 2005; Myers et al., 1996) not all studies seek to understand fear of falling in conjunction with associated activity restriction, which is what the SAFE measures (Lachman et al., 1998). As a result, these findings may influence the data found and affect how this data could be disseminated into practice and applicability to the older adult population, as they do not represent specific situations, rather, the confidence or efficacy in situations in general involving activity restriction. A fear of falling should be researched in conjunction with situation specific phenomenon to understand how older adults appraise fall-risk in varying scenarios. However, the fear of falling literature has been rather general in its commentary. Specifically addressing that those who have a fear of falling in one situation, tend to have it in other situations (Lachman et al., 1998).

The fear of falling research literature has typically conceptualized fear of falling using Bandura's Self Efficacy theory, otherwise known as Social Cognitive theory (Lachman et al., 1998; Tinetti et al, 1990; Ward-Griffin et al., 2004). Bandura's theory proposes that one's beliefs about their capabilities can affect how they behave in a given situation (Bandura, 1978). Outcome expectancies are based on one's perceived self-efficacy where they have expected performance outcomes (Bandura, 1978). Older adults may perceive different physical and social effects that impact their behaviour in fall-risk situations and how they conceptualize their actions in regards to their self-efficacy to avoid potential fall-risk.

Falls and the Consequences of Fear and Falls

A fall has been defined as coming to rest unintentionally on the ground or lower level that may include a chair or bed (Tinetti et al., 1988). Approximately 50% of falls occur within the home and immediate surroundings. These areas include commonly used rooms like the bedroom, living area, or kitchen, with fewer falls, but more injurious falls have been found to occur in the bathroom, on the stairs, and in the kitchen (Lord et al., 2007; Stevens, Mahoney, & Ehrenreich, 2014). However, the problem concerning falls in the older adult population is more than that it occurs with high frequency (Rubenstein, 2006). Many falls in older adults involve a combination of interaction with environmental hazards and increased susceptibility of older adults to falls (Iwarrsson, Horstmann, Carlsson, Oswald, & Wahl, 2009). While research suggests exercise, review of medicine for side effects, review of eyewear to maximize vision, and methods to make the home safer (i.e., reducing trip hazards, improving lighting, adding grab bars in the bathroom) to prevent falls (CDC, 2013; Gill, Williams, & Tinetti, 2000; Stevens, Holman, Bennett, 2001) older adults' judgements of their own personal fall-risk susceptibility is unique. For instance, personality can affect an individual's response to a threat or the consequences of falling (Kloseck, Hobson, Crilly, Vandervroot, & Ward-Griffin, 2007). Specifically, an extroversion personality was found to be a major determinant of engagement in activities outside of the home, whereas in the home, confidence in performing activities of daily living significantly influenced an older adult's independence (Kloseck et al., 2007).

The accumulated effects of aging such as multiple comorbidities and impaired mobility to avoid a fall after an unexpected slip or trip can make a trivial fall increasingly dangerous (Rubenstein, 2006). Consequently, older adults may be found to be overcautious and subsequently decrease activity, which can be both functional and detrimental to prevent

future falls (Delbaere, Crombez, Vanderstraeten, Willem, & Cambier, 2004; Lee, Mackenzie, & James, 2008; Rubenstein, 2006). Judgements of risk are naturally subjective where an individual's risk-benefit trade-off may affect their judgement of fall-risk in different scenarios (Michalsen, 2003). Slovic (2000) suggested that the perception of risk depended greatly on the way relevant information is presented. Often, the circumstances surrounding a fall can play an important role than the fall itself (Myers et al., 1996). Inherently, one's appraisal of fall-risk in a scenario may affect the intentions to act and the decisions older adults may construct about activities of daily living. Risk appraisal can affect the potential for an older adult to become fearful of falling and one's self-efficacy to perform an activity. However, a fear of falling is not just something that happens from a fall, rather, a fear of falling has been found to be the recognition of being at risk of both falling and the adverse outcomes that may result from a fall (Bertera & Bertera, 2008; Friedman et al., 2002).

Once an assessment of potential fall-risk is appraised, activity may be limited and this appraisal of fall-risk may be likely to continue regardless of a previous fall or near fall experience, which can ironically increase the risk of falling leading to a vicious downward spiral (Cumming et al., 2002; Friedman et al., 2002). Friedman et al. (2002) found that only subjects who decreased activities were more likely to become a faller. Lee et al. (2008) found that activities participants engaged in changed over time and many had begun to limit their activity in some manner. Again, a general decrease of activity has been apparent in older adult's behaviour. However, this change was also attributed to health and aging, highlighting that it was not solely due to a fear of falling. Lee et al. (2008) further suggested that extra care was taken to avoid falls in risky activities. Self-efficacy may contribute a large role in activities performed and not performed, which has a resultant effect on becoming a faller or falling again.

A fear of falls has been suggested to be an important factor in predicting future falls (Bertera & Bertera, 2008; Lach, 2005) with the major consequence of a fear of falling being the avoidance of activities (Delbaere et al., 2004). Even in the absence of injury or a fall history older adults may fear falling (Cumming et al., 2000; Delbaere et al., 2004; Painter et al., 2012; Yardley & Smith, 2002). A fall or the fear of a fall can trigger a downward spiral through avoidance of feared activities and result in functional decline (Boyd & Stevens, 2009; Delbaere et al., 2004; Friedman et al., 2002; Suzuki, et al., 2002). For example, "…reduction of physical activity leads to further deterioration of [older adults'] physical capabilities and their confidence in their performance of activities of daily living" (Delbaere et al., 2004, p. 372). Deterioration of health may include decline of physical and mental capability affecting one's self-image, self-confidence, and create the feeling of lack of ability to perform activities that can inevitably lead to fearing the potential of a fall (Boyd & Stevens, 2009; Suzuki et al., 2002).

Older adults that indicated they had higher levels of fear of falling were found to engage in fewer activities (Li, Fisher, Harmer, McAuley, & Wilson 2003). Some older adults may stay at home or self-impose activity restrictions and become fearful of activities in general due to apprehension of potential fall-risk and the consequences that might occur should they fall (Arfken et al., 1994; Delbaere et al., 2004; Vellas, Wayne, Romero, Baumgartner, & Garry, 1997). A decrease in activity may negatively impact the older adult through affecting both physical and mental abilities, which in turn can increase fall-risk (Delbaere et al., 2004; Murphy et al., 2002; Yardley & Smith, 2002). Further research is needed to elaborate these ideas and shed light on older adults' appraisals of fall-risk and whether they are accurately assessing a situation at hand given their self-efficacy and judgement of risk.

Statement of the Problem

Older adults' interactions with the world change as they age. Often, these interactions are influenced by their appraisal of risk and self-efficacy to perform activities of daily living. An issue faced by research literature concerning fall-risk and fear of falling amongst older adults is that it has predominately been examined through the lens of fear of falling and its negative consequences, particularly activity restriction. More specifically, research has been focused on how older adults have a fear of falling across multiple situations using an averaged score and how a fear of falling is related to activity restriction or participation restriction that leads to a downward spiral of negative consequences. Additionally, studies have primarily either been quantitative investigations that describe behaviour or qualitative research that incorporates the voices of participants. However, in actuality, risk appraisal may be a combination of both objective and subjective perception as there is a dynamic interplay of these aspects that leads to specific risk-taking behaviour.

A current problem is that research has lacked perspectives of older adult's appraisal of risk in conjunction to what their actual abilities are, which can be a result of their social and behavioural actions. As a result, investigating both appraisal of fall-risk and functional ability can lead to a greater understanding about risk-taking behaviour and the value of risk in activities of daily living. While there has been an abundance of research concerning children and risk, for instance children's risk perception and their appraisals in different environments that involve risk-taking and the potential for injury (Hillier & Morrongiello, 1998; Little & Wyver, 2010; Morrongiello & Matheise, 2004) there has a been a lack of it in older adult literature. In the present study, through the use of a mixed methods design, community-dwelling older adult's appraisal of fall-risk will gain perspectives on older adult's judgement of risk.

An exaggeration of the potential danger and risk has been the hallmark of fear of falling. However, accurate assessment of risks may be essential for remaining independent and quality of life for older adults. Moving forward, what remains to be explored is whether older adults' appraisals of risk has lead to misappraisal of risk in situations and a fear of falling. Further investigation is needed to understand whether older adult's appraisal of potential fall-risk is accurate or inaccurate. As a result, research literature can inform fall prevention strategies through the enhanced understanding of older adults' appraisals of fall-risk and thus risk-taking behaviour.

Research Objective

This mixed methods study addressed how community-dwelling older adults appraised various scenarios through the assumption that risk may be incremental by objective factors used to inform behaviour (the four fall-risk scenarios with varying numbers of hazards that determine its riskiness). The two research questions in this study were 1) Is fall-related fall-risk appraisal general or situation specific? 2) Are older adults' fall-risk appraisals and balance confidence judgements accurate? By investigating whether fall-risk appraisal is specific or general and older adult's accuracy of risk judgements, research can move forward and achieve an enhanced understanding of what key sources of information older adults use to inform their intentions to act and a greater understanding regarding how their appraisal of risk affects their decision-making.

The research questions in this particular study was thought to best answered using a mixed methodology, which provided a more comprehensive view than one methodology alone (Creswell, 2014). Specifically, an embedded correlational design was utilized where one data set provided a supportive and secondary role, qualitative data to the quantitative

data collected. Additionally, theories are commonly used in mixed methods studies to help inform the study. In this particular study, three theories were used to inform the research which included: Health Action Process Approach (HAPA) (Schwarzer, 1995), Risk as Value theory (Finucane & Holup, 2006), and Self-Efficacy theory (Bandura, 1978). The focus of the use of the HAPA model was the role of the initiation phase where intentions are formed to pursue actions based on one's self-efficacy, outcome expectancies, and appraisal of risk. The focus of the Risk as Value theory was to further the understanding that risk appraisal is a combination of analytic and emotional evaluations. Finally, the self-efficacy theory provides a greater contextual understanding of people's motivation to act, which is impacted by their self-confidence. Specifically, how one's expected outcomes frame behaviour. These theories were important to inform the research questions and strengthen the study through the use of each of their frameworks in collaboration with the data found to inform the final chapters in this study.

Chapter 2: Literature Review

Introduction

This chapter presents the findings of a literature review conducted to find studies relevant to fall-risk and fear of falling and how both have been conceptualized in the literature to date. This review began its focus on research that examined risk, falls, and fear of falling. Next this review incorporated studies that highlighted older adult's fear of falling and associated avoidance of activity. The next section of the review focused on interpretations of fall risk appraisal and fear of falling, and the affect of personality on risk-taking. The final section's focus was on the role of self-efficacy and how appraisal of fall-risk contributes in older adult's intention to act and make decisions.

Factors Associated with Falls

There are many factors that can contribute to the risk of falling. Risk factors and one's perception of risk can affect one's potential to slip, trip, or fall. Risk can mean diverse things to different people. For instance, risk factors can be an objective assessment of the environment or the self that can increase the potential of a fall (Lord et al., 2007). On the other hand, risk appraisal is a rather "…subjective assessment of the probability of an undesirable event and its seriousness can be called 'perceived risk'…[relying] strongly on personal traits and sociocultural parameters, such as education, experience, habits, political orientation, beliefs, and values" (Michalsen, 2003, p. 202). Both risk factors and appraisal of risk contribute important roles in potential risk, falls, and fear of falling.

Some intrinsic risk factors can be difficult to avoid in older age. For instance, a multiplicity of medical conditions and associated medications have been linked to falls

(Lord, et al., 2007). Rubenstein (2006) found that there was an increased susceptibility to fall from intrinsic factors that could include multiple comorbidities and the accumulated effects of age. Moreover, many diseases can increase the risk of falling by direct influence on one's physiological system. For example, impaired visual acuity and contrast sensitivity can result from cataract formation and Parkinson's disease can cause problems with balance and gait which can also have a direct impact on the cardiovascular system (i.e., decreased cerebral perfusion pressure) (Lord et al., 2007). The aforementioned can result in misinterpretation of spatial information (i.e., the surfaces on the ground) and misjudgements of distances of objects and distances to walk. These inaccurate judgements may increase the risk of falling and the potential for one to have increased fear of falling which can impact an older adult's subsequent behaviour.

Predisposing risk factors can also affect the development of a fear of falling. Murphy, William, and Gill (2002) put forward that there are four: 80 years of age or older, visual impairment, a sedentary lifestyle, and no available emotional support. Moreover, Zijlstra et al. (2007) articulated how there was a significant independent association with older adults experiencing fear of falling and avoidance of activities in those higher in age, female gender, low self-report of health, and those with a previous fall history. Tischler and Hobson (2005) also found that older adults developed a fear of falling as they aged or after experiencing a fall. Lach (2005) suggested that independent risk factors for developing a fear of falling in older adults were: feeling unsteady, fallen two or more times in the past, or self-report of fair or poor health status. Murphy et al. (2002) further articulated that individuals who had one or more predisposing factors of a fear of falling were significantly more likely to develop it. While there are many predisposing risk factors in the development of a fear of falling, this may not develop solely based on one's experience with a previous fall (Boyd & Stevens,

2009; Cumming et al., 2000; Murphy et al., 2002). Additionally, some of these predisposing risk factors may be potentially modifiable and are important to consider for preventative interventions for falls and fear of falling (Murphy et al., 2002).

In older adults, many sensory and neuromuscular senses decrease which can increase the potential of fall-risk. For example, older adults may experience a deterioration in the following: reaction time (i.e. increased reaction time results in a slower responses), vision (i.e., decrease in visual acuity, contrast sensitivity, depth perception, glare sensitivity, and dark adaption), vestibular function (i.e., rotational testing, optical stability), peripheral sensation (i.e., tactile sensitivity, vibration sense, proprioception), and muscle strength (i.e., power, endurance) (Lord et al., 2007). Brouwer, Musselman, and Culman (2004) found that older adults who reported concerns about falling walked slower and had a lower self-report of their physical health than non-fearful older adults regardless of a previous fall history. As one ages gait, patterns can alter. For example, while walking on one level an older adult may walk slower, have reduced step length and cadence, increased cadence variability, and increased time spent in double limb support (Lord et al., 2007). The aforementioned suggests that impaired balance control can be associated with an increased risk of falling and fear of falling.

Along with intrinsic risk factors for falls, there are also extrinsic risk factors. These can include both exposure (frequency and extent) and the hazard itself (an object that could adversely affect health) (Gill et al., 2000; Michalsen, 2003). These are risk factors that can be more easily modified in comparison to many intrinsic risk factors. Environmental risk factors within the home can include general items (i.e., slippery floor surfaces, loose rugs, a raised door sill, obstructed walkways (i.e., cords, pets), shelves or cupboards that are too high or low, spilt liquids on the floor); furniture (i.e., a low chair, low or elevated bed height,

unstable furniture); the bathroom (i.e., lack of grab bars, a low toilet seat, slippery surfaces on the floor); and stairs (i.e., no or inadequate handrails, non-contrasting steps, steep or narrow stairs, distracting surroundings) (Gill et al., 2000; Lord et al., 2007). Additionally, indoor falls versus outdoor falls are another factor to consider. Falls in the bathroom were almost two and a half times more likely to result in an injury (7.8% falls with no injuries vs. 17.3% falls with injuries) than in the living room (25.8% falls with no injuries vs. 24.7% falls with injuries) (Stevens et al., 2014). Outdoor locations away from the home can include public places with cracked pavements, curbs, uneven ground, and slippery surfaces (especially when snow or ice contribute to the potential to fall) (Bleijlevens et al., 2010; Lord et al., 2007; Peel, 2011). As a result, older adults may be found to eliminate potential fall hazards by removing dangerous objects and avoid environments deemed as unsafe (Ward-Griffin et al., 2004).

Proportionally, more men than women were found to fall outside the home, who tended to fall frequently inside the home (Lord et al., 2007). While more falls were found to occur indoors and around the home than outdoors, (Bleijlevens et al., 2010; Milat et al., 2011; Nachreiner, Findorff, Wyman, McCarthy 2007) indoor falls may carry a lower perceived risk of injury as indoor surfaces are generally ‘softer’ and these activities may be less vigorous resulting in less impact when and if a fall were to occur (Bleijlevens et al., 2010) which suggested potential misinterpretation of risk. The most common activities undertaken when a fall occurred was walking (43.8%), physical work or chores (16.7%); carrying or bending activities (15.8%); and while on steps, stairs, the curb or gutters (10.8%) (Milat et al., 2011; Nachreiner, et al., 2007). Falls were strongly related to performing activities of daily living (Lord et al., 2007). A physical vulnerability, however, does not exclusively determine whether an older adult has a fear of falling (Huang, 2004). As a result,

research should expand on older adult's appraisal of fall-risk and understand older adult's reasoning for avoiding activity and their appraisal of risk to understand the impact fear of falling has on activities of daily living.

Fear of Falling and Associated Avoidance of Activity

Friedman et al. (2002) suggested that a fear of falling may be the recognition of being at risk of both falling and the adverse outcomes that may result from a fall (Friedman et al., 2002). Specifically, there are four components of fear: sensations, feelings, cognitions, and behaviours (Lader & Mark, 1973). Fear can include experiential aspects of sensations and feelings as well as psychological components that include "…scanning of the environment for signals of danger, difficulty concentrating, narrowed-down perceptual field, limited consideration of alternatives" (Kreitler, 2004, p.1). Risk has been appraised with varying perceptions based on gendered meaning and responsibility, history of falls, poor perceived health, decreased confidence while performing activities of daily living, feeling unsteady, and recognition of potential fall-risk (Friedman et al., 2002; Horton, 2007; Yardley & Smith, 2002)

Risk is unique to both the circumstance and the individual. Some fall-risk factors are unavoidable and some may be viewed as avoidable. Older adults may not adopt fall prevention techniques because they do not believe or do not want to admit they are at risk of falling (Yardley et al., 2006). Additionally, older adults may adjust their behaviour to avoid potential fall-risk based on their history of falls or perceptions of prospective risks, which has potential to impact both function and quality of life. Specifically, Friedman et al. (2002) suggested that there is a downward vicious cycle of fear of falls, decreasing function and functional decline, which increases fall-risk. Inherently, a fear of falling may affect the

intentions and the decisions older adults make about activities as they relate to the appraised risk in particular situations that have greater potential for falls.

A fear of falling has been recognized as a negative outcome and a potential precursor of falls that can impact perceived health (Peel, 2011). Falls can lead to functional decline of physical and mental capability that may affect one's self-image, self-confidence, and create the feeling that one lacks the ability to perform activities (Boyd & Stevens, 2009; Rubenstein, 2006; Suzuki et al., 2002). These negative consequences may affect older adult's engagement in activities and in turn increase their susceptibility to an increased risk of falling, development of a fear of falling, or maintaining a fear of falling, which could negatively impact their health and physical condition. Allison et al. (2013) suggested older adults may restrict their activity as a compensatory strategy because of both balance and gait impairments that may lead to a fall and/or injury risk and/or make it difficult to be independently mobile in the community. These authors suggested that participation restriction better reflected imbalance and mobility than a fear of falling. The term participation restriction was considered comparable to the term activity restriction. However, for the purposes of this study the term activity restriction will be used as it has been used in the majority of the fear of falling literature.

A fear of falling has been commonly associated with negative consequences that include: a decline in social interaction, frailty (involves more than one characteristics being present affecting physical functioning, psychological and cognitive function and social functioning) (Fried, Darer, & Walston, 2003), poor mobility, embarrassment, increased risk of falling, and the loss of independence and autonomy (Arfken, et al., 1994; Boyd & Stevens, 2009; Friedman et al., 2002; Host et al., 2011; Lee et al., 2008; Roe et al., 2008; Yardley & Smith, 2002). More specifically, research literature to date has focused on activity restriction

where older adults have been found to stop various activities altogether (Arfken et al., 1994; Cumming et al., 2000; Friedman et al., 2002; Howland et al., 1998; Murphy et al., 2002; Suzuki et al., 2002; Vellas et al., 1987; Yardley & Smith, 2002; Zijlstra et al., 2007). Specifically, one of the critical mediating factors between fear of falling, balance and mobility limitations, and fall risk may be activity restriction (Allison, et al., 2013). Li et al. (2003) found that older adults who indicated that they had higher fear of falling engaged in fewer activities. Similarly, Zijlstra et al. (2007) found that in those who experienced a fear of falling, two-thirds (65.5%) avoided activity. Additionally, a fear of falling has also been found to limit activities that older adults consider to be non-essential activities of daily living in order to decrease fall-risk (Lee et al., 2008). A decrease in activity may negatively impact the older adult both physically and mentally, which in turn may increase fall-risk (Murphy et al., 2002; Yardley & Smith, 2002). However, activity restriction in conjunction with "fear of falling may be an appropriate adaptive reaction to accurately perceive balance and gait deficit in the short term" (Allison et al., 2013, p.21). On the contrary, fear and apprehension about activities that older adults believe could result in a fall may be a factor towards them to stay at home or self-impose activity restrictions (Arfken et al., 1994; Vellas et al., 1997).

Older adults may avoid activities based on commonly feared consequences of falling. These fears may include fear of suffering bone fractures from a fall (Host et al., 2011) or admission to a long-term care facility (Cumming et al., 2000). Specifically, two important dimensions of perceived negative consequences were found: the expectation of physical harm that may lead to functional disability and loss of independence and the expectation of social embarrassment that may lead to damage of personal confidence and identity (Yardley & Smith 2002). In addition, older adults feared the consequences of a fall, where physical injury was not the primary factor, rather, it was the life altering events that could decreased

one's independence (Tischler &Hobson, 2005). Older adults may fear the outcome of falls, but may be reluctant to adopt fall prevention strategies in attempt to avoid the stigma behind being classified as a faller (Boyd & Stevens, 2009). Similarly, older adults may be reluctant to acknowledge fall-risk and openly discuss their fears relating to falling because of fear of identity damage that can affect fall prevention adherence (Yardley & Smith, 2002). Thus, activity restriction may occur as an older adult perceives they can easily control the potential of a fall by his or her own actions.

It is important to consider the perspective that the restriction of activity "…can have a protective impact on the short term, by limiting the risk of a new fall yet it ends up having a negative impact on the long term by reducing [their] physical abilities…" (Gaxatte et al., 2011). Likewise, in the short-term, a decrease of activity or avoidance has the potential to protect against falls, though in the long-term, continued activity restriction or avoidance can diminish both physical and mental health (Murphy et al., 2002; Tischler & Hobson, 2005; Yardley & Smith, 2002). Similarly, Delbaere et al. (2004) found that restriction of activities was associated with a decrease in physical and psychological abilities when sustained over a long period of time. Older adults may have an assumption that if they avoid or restrict activities they can as a result avoid falls (Friedman et al., 2002). However, if restriction of activity is continued, this can increase their risk of falling if restriction is not performed in a rational manner with the risk at hand. "People today have some control over the level of risk they face, but reduction of risk often entails reduction of benefit as well" (Slovic, 2000, p. 32). There may be a 'reasonable' fear of falling that takes into account the individual and environmental factors that could promote a fall, (Gaxatte et al., 2011) however, little research literature found has expanded on how a fear of falling may be reasonable and may be a protective strategy against the potential of falls.

Prevalence rates of fear of falling and the avoidance of activity have been generally based on samples of community-dwelling older adults, however these samples do not represent the general population of community-dwelling older adults (Zijlstra et al., 2007). Specifically, there has been an overrepresentation of females across the fear of falling literature (Howland et al., 1998; Huang, 2004; Lee et al., 2008; Suzuki et al., 2002; Tischler & Hobson, 2005; Ward-Griffin et al., 2004). However, it has become clear that there is a gendered meaning of risk and responsibility. Zijlstra et al. (2007) found that more women indicated that they were afraid of falling and avoided additional activity. Suzuki et al. (2002) illustrated that females were also more likely to express a fear of falling than males. The underrepresentation of males and overrepresentation of females can be problematic as the perspectives of male older adults in research literature may be lacking, which may lead to misinterpreted information about the aging population.

Strong beliefs are difficult to modify. As a result, initial impressions tend to structure the way subsequent cues are interpreted (Slovic, 2000). Few studies have explored how older adults approach potential fall-risk in specific situations, rather, placing emphasis on its negative consequences and associated avoidance of activity across various situations. While a fear of falling does greatly impact physical and functional outcomes, the fear of falling literature has lacked an understanding on what predicts accurate appraisal of judgement in specific situations older adults perform regularly.

Interpretations of Fear and Fear of Falling

A fall has been primarily investigated using a perspective to reduce physical injury or trauma (Ballinger & Payne, 2002; Zijlstra et al., 2007). However, falling is an emotional topic where an older adult may be inclined to distance themselves from certain situations to

avoid stigmatization of frailty or vulnerability (Ballinger & Payne, 2000; Horton, 2007). Fear can be characterized as either a rational (moderate or proportionate) or an irrational (excessive or disproportionate) response to a stimulus (Kreitler, 2004). Accordingly, changes in the way risk is expressed can have marked impact on one's perception and decision to act accordingly (Slovic, 2000).

Many studies have used the single item question, 'are you afraid of falling' (Arfken et al., 1994; Freidman et al., 2002; Lach, 2005; Lachman et al., 1998; Murphy et al., 2002; Suzuki et al., 2002; Tinetti et al., 1988; Tinetti et al., 1990; Yardley & Smith, 2002; Zijlstra et al., 2007) which has been found to reflect a general state of anxiety that is not specific to either falling or balance (Myers et al., 1996) rather than specific situations. Of those individuals who had a fear of falling, 46% to 65.5% reported avoiding activity (Friedman et al., 2002; Howland et al., 1998; Zijlstra et al., 2007). The fear of falling literature illustrates that a fear of falling is a common concern for community-dwelling older adults across activities (Arfken et al., 1994; Howland et al., 1993; Lach, 2005; Tinetti et al., 1988), but risk and self-efficacy may be specific to particular situations and may not be present in all activities. For example, using the Survey of Activities and Fear of Falling in Elderly (SAFE) score, 'going out when it is slippery', followed by 'taking a bath' were found to have the highest level of fear (Lachman et al., 1998). Similarly, using a qualitative approach, Host et al. (2011) found that participants stopped certain activities they thought were risky to avoid the risk of falling. Generally, perceptions of risk are often inaccurate as risk judgements can be influenced by both memorability of previous events from experience and the imaginability of the future (Slovic, 2000). Thus, the selection of a fear of falling measurement may affect conclusions that can be drawn about its relationship to fall-related behaviour. It is important

for the construct being researched to correspond with the construct measured (Jorstad et al., 2005).

Allison et al. (2013) measured fear of falling with two methods, the single question, 'are you afraid of falling in the future' and the SAFE part B fear of falling score, which surveys past behaviour. They suggested that the single question adds little value in comparison to the SAFE, which they found to be related to balance and mobility abilities as measured by the Berg Balance Scale and the Timed-Up-and Go. However, the aforementioned authors chose to survey the single question with the response option of yes/no/uncertain rather than the graded response options of very fearful/somewhat fearful/not fearful and in reference to their future behaviour, which diminishes the validity of findings. Also, the use of SAFE studied fear of falling in the past and focuses on activity restriction. Both these measures do not provide valid appraisal of their fall-risk as recall and one's future predictions of their behaviour can be inaccurate. Simply put, a fear of falling is not black and white, rather, a it can be found to be on a graded scale with different reasoning for each response, which is why when measuring a fear of falling, it should be inquired such that an older adult can express it as a spectrum rather than having a fear of falling or not.

Ward-Griffin et al. (2004) suggested that self-confidence rather than fear had an influence on whether older adults sought out an active lifestyle and found older adults limit their involvement with the world in order to exercise greater precaution rather than striving for independence. While reducing activity and slowing down can be a benefit for some, for others it can be a frustrating experience and limit their activity all together (Lee et al., 2008). Bertera and Bertera (2008) suggested that in some instances fear of falling may not be rational and may not reflect an accurate assessment of one's physical and mental capabilities. This is evident in a significant proportion of individuals who avoid activities and have never

fallen, yet have a fear of falling. A fear of falling is unique and different for each individual as there may be varying reasons for its development. Older adults who limit their activities are at a high risk of becoming fallers (Cumming et al., 2000; Fletcher & Hirdes, 2004; Friedman et al., 2002; Peel, 2011; Yardley & Smith, 2002), which seems paradoxical since an older adult may restrict their activity in order to avoid falls in the first place.

The construction of risk has mainly focused on physical and functional outcomes where risk is external to the self and may be predicted (Ballinger & Payne, 2002). However, a fear of falling does not simply lead to negative consequences, nor does it have to lead to activity restriction altogether. The appraisal of risk can be a reflection of both subjective and objective interpretation. Also, the appraisal of risk can have positive impacts leading to reasonable responses to fall-risk involving cognitive processes where one may elicit cautious behaviour in situations thought have greater risk, yet still have independence to maintain activities of daily living (Huang, 2004; Lach, 2005; Murphy et al., 2002). The recognition of risk in various situations may be a first step towards preventing falls by considering a reasonable response to a risky event and thus promoting effective coping skills (Huang, 2004). Older adults however may reject fall prevention to avoid potential threat to their identity and autonomy (Yardley et al., 2006). Older adults have been found to be more concerned with risk to personal and social identity rather than the fall-risk itself (Ballinger and Payne, 2002). Consequently, perceptions of risk associated with situations can manifest in behavioural changes through fight (facing risk) or flight (avoidance of risk) reactions.

The role of psychological decision processes can play an important role in societal risk taking and needs to be further understood in older adults to improve primary fall prevention strategies and effective living in older adults. For example, personality can influence one's decision process. Kloseck et al. (2007) suggested there are five personality

factors that influence an individual's actions and behaviours: extroversion, agreeableness, conscientiousness, neuroticism, and openness. Between fallers and non-fallers, Kloseck et al. (2007) found that there were statistically significant differences found in personality traits: extroversion personality trait ($p<0.001$), disposition ($p=0.001$), and the experience of falling ($p=0.012$). Moreover, confidence was found to be a primary determinant of decision-making. By understanding personality and older adult confidence in activities of daily living can further our understanding of older adult's fall-risk appraisal and its affects on risk-taking.

The fear of falling literature has placed emphasis on fear evoked in an irrational manner, taking on the perspectives of the burden of falls or the negative consequences where fear of falling has imposed constraints on daily tasks leading to the avoidance of activities (Arfken et al., 1994; Boyd & Stevens, 2009; Howland et al., 1998; Huang, 2004; Li, et al., 2003; Yardley & Smith, 2002). A physical vulnerability, however, does not exclusively determine whether an older adult has a fear of falling (Huang, 2004). Fear is not a fixed entity, rather, it is "…focused on the sense of threat or danger, regardless of whether it is known, defined or present" (Kreitler, 2004, p. 2). Fear on its own may not be damaging unless good judgement is impaired, which may lead to a decrease in activities if daily living (Lachman et al., 1998). However, little empirical work has addressed how enabling people to increase control over activities could improve their health. What remains to be explored is whether an accurate perception of fall-risk has been found in the research literature where reasonable precaution can be used in scenarios of fall-risk that does not compromise daily activity.

Lachman et al. (1998) suggested that those who experience fear of falling do not necessarily restrict their activities, rather, they make appraisals based on personal preference, external constraints, and their physical limitations. In order to understand whether a fear of

falling can be reasonable. Also, there is a need to investigate older adult's appraisal of fall-risk in various activities to understand how their intentions affect behaviour and to investigate if these appraisals converge or diverge with their actual functional and balance abilities. These appraisals of fall-risk and older adult's corresponding behaviour can be better understood by utilizing theory and previous research. Specifically, one's function may be more related to self-efficacy than decline in activity (Brouwer et al., 2004). Accordingly, older adults' perceptions of their ability may affect their interpretations of fall-risk, expected outcomes, and subsequently their actions.

Self-efficacy

Self-efficacy can either enhance or impede one's motivation to act. It is important to note that self-efficacy is not the same as positive illusions or unrealistic optimism, rather, it is one's perceived capabilities in a specific situation (Schwarzer & Fuchs, 1996). Bandura suggested that behaviour is governed by expectancies: situation-outcome expectancies, outcomes expectancies, and self-efficacy expectations (1978). Moreover, one's self-efficacy determines the appraisal of resources in stressful situations, which contributes to the formation of behavioural intentions (Schwarzer, 1992).

Specifically, self-efficacy is a central concept to explore in terms of one's self-care and self-management of health, which is especially important for appraising fall-risk. For instance, self-efficacy to perform activities can be rational and advantageous where it may have the potential to promote effective falls prevention techniques like increased caution and self-awareness. In contrast, when one has little self-efficacy, it can compromise physical and psychological well-being and develop into irrational behaviour due to decreased confidence in one's capabilities to perform activities (Howland et al.,1998; Lachman et al., 1998;

Mahler & Sarvimki, 2012). "Too much fear without a sense of personal control makes self-protection seem like an exercise in [uselessness]" (Bandura, 1997, p. 280). A threat has been viewed as personally uncontrollable based on one's self-efficacy. An example of risk appraisal is apparent when "People fear and tend to avoid threatening situations they believe exceed their coping skills, whereas they become involved in activities and behave assuredly when they judge themselves as capable of handling situations that would otherwise be intimidating" (Bandura, 1978, p. 141). Self-efficacy has a major impact on one's behaviour where once diminished, the perception of being in control may be absent due to decreased confidence in one's abilities.

A source of one's personal self-efficacy can be from performance accomplishments (based on personal experience), vicarious experience (seeing others perform threatening activities), verbal persuasion (attempt to influence behaviour through suggestion), and physiological affect (emotional arousal) (Bandura, 1978). Personal experience may include situations where a previous fall, slip, or trip had occurred. For instance, an older adult had expressed how each time they approached a location where a previous fall had occurred they trembled and were reminded of the event resulting in decreased self-efficacy to perform that particular activity (i.e., the stairs) (Huang, 2004). Fear can occur from perceived risks "…through other forms of learning, such as personal experiences, hearing from others, watching others ('modeling'), or receiving information from books or media" (Kreitler, 2004, p. 5). For example, "…knowing a friend or relative who had experienced a serious fall was significantly associated with activity curtailment" (Howland et al., 1998, p. 555). However, vicarious experience may not be the most accurate. The lack of self-efficacy when personal experiences are not involved relies on social comparison and is found to be a less dependable source of one's capabilities than personal experience (Bandura, 1978).

People will only attempt activities they believe they can accomplish and avoid activities they believe they will fail (i.e., a fall) based on the different sources of self-efficacy and perceived fall hazards (Hayden, 2009). Older adults may avoid situations not simply because of fear, but also because they lack self-efficacy to manage the potential fall-risks perceived (Bandura, 1997). A perception of increased risk may take place when one has decreased self-efficacy to perform activities of daily living and may be likely to continue in spite of whether a fall or potential fall had or will occur or subsequent injury. With this in mind, "Regardless of the induced emotional states, increases in efficacy beliefs and positive outcomes expectations promote adherence to healthy behaviour" (Bandura, 1997, p. 281). For an older adult to adopt valued health behaviours or change detrimental habits (i.e., avoiding specific activities to avoid a potential fall) three cognitions need to take place: 1) life situation is perceived as dangerous, 2) change of behaviour will reduce the threat, and 3) one can adopt positive behaviour or stop the negative behaviour (Schwarzer, 1992). As a result, in order to increase self-efficacy, situation-outcomes expectancies, outcomes expectancies, one needs to have confidence that the individual is in control and capable of performing an activity. Without self-efficacy, the appraisal of resources in stressful situations may subsequently contribute to the formation of behavioural intentions that may lead to unrealistic optimism due to inaccurate perceptions of risk or vice versa.

Literature concerning risk perception and older adults has predominately led to a portrayal of risk where older adults are found to avoid activities or have decreased confidence across activities. Research literature though has lacked reasoning as to why one may have an increased perception of fall-risk or decreased self-efficacy in another. There are issues with appraisals of one's capabilities in advancing old age that include misappraisals where declining capabilities are conceptualized as the focus rather than what an individual

can do. Advancing old age generally presents losses of physical stamina, decreased sensory functions, and physical capacities (Lord et al., 2007). Reappraisal of self-efficacy is needed for personal efficacy in activities (Bandura, 1997), especially in older adults where outcomes and expectations are linked to their behaviour. Thus, activity avoidance may be more of a function of one's lack of confidence or faulty appraisal in a given situation, rather than one's inability in a given activity. However, fear may be more emotional than simply one's confidence. The use of self-efficacy theory will help conceptualize how one's expected outcomes frame behaviour. Little empirical research has investigated whether older adults' perceptions of risk and confidence are specific to situations and potential outcomes. These misappraisals may be key to identify, to understand older adults' appraisal of fall-risk and their risk-taking in scenarios of different risk.

The Health Action Process Approach (HAPA) Model

Encompassing self-efficacy, outcome expectancies, and perception of risk, the specific focus of this study will be enhanced with the use of Schwarzer's (1995) HAPA model (see Figure 1) that is grounded by Bandura's Social Cognitive theory (1978). The model suggests that the adoption, initiation, and maintenance of behaviour were constructed as a process with two stages, a main distinction of HAPA compared to other health models. The two phases include the motivation (decision-making) phase and the action (maintenance) phase (Schwarzer, 1992). The motivation stage represents where intentions are developed, whereas the volition phase is where intentions are translated into action (Schwarzer, 1999). Specifically, there are three direct paths from which intention is formed: self-efficacy, followed by outcome expectancies, and an indirect, yet significant factor is the perception of risk.

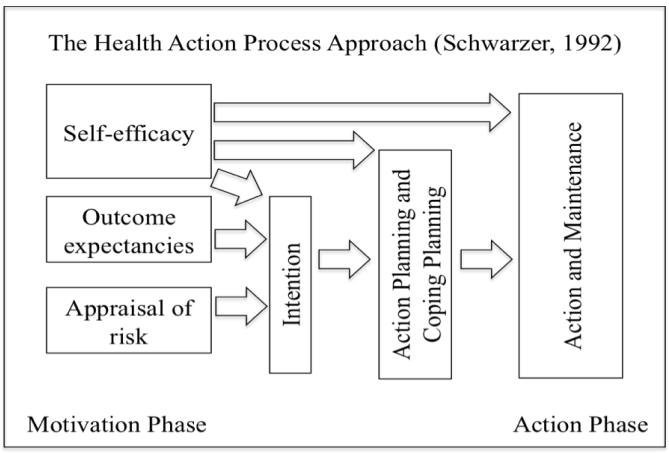

Figure 1. The Health Action Process Approach Model

The focus of the use of HAPA in the present study was the role of expectancies and the self-regulatory process where one's self-efficacy and the appraisal of risk may affect the production of behavioural intentions. The perception of risk can motivate a variety of behaviours. However, it is a matter of what the individual decides in the motivation phase that may or may not adversely affect health in the volition phase. Schwarzer (1995) suggested that in order for people to adopt a behaviour or give up a detrimental habit, such as avoiding activities, there needs to be confidence in outcome expectancies. These expectancies include: a risky situation, behaviour change to reduce a threat, and the ability to control a risky habit. Risk can be an outcome of behaviour as it affects the severity and vulnerability of the threat that is perceived in a given situation. The more meta-cognitive skills and coping strategies developed, the better an individual can match specific risk situations and their actions and thus the easier risk can be controlled (Schwarzer, 1992). It is important to note that actions are not only a function of intentions or cognitive control. Perceived and actual environments also impact action, which is strongly influenced by self-efficacy expectations as well as perceived situational barriers and support from others (Schwarzer, 1992).

Older adults must perceive themselves as in control and have confidence in their ability in order to allow potential beneficial consequences such as increased self-awareness and accurate appraisal of fall-risk to occur. To inform action in different situations older adults may use previous experience or vicarious experience to inform/motivate behaviour. For example, extra care may be taken to avoid falls in risky activities or situations (Horton, 2007). Also, activities not related to self-care may be avoided and activities viewed as essential activities of daily living may be maintained to remain independent (Lee et al., 2008). Furthermore, due to heightened nervousness, older adults may begin to use caution when walking by taking smaller steps and limit their life space (Host et al., 2011). In theses cases, self-efficacy, outcome expectancies, and risk appraisal were used in different combinations in the intention stage that affected their actions.

Critical for efficacy beliefs, ones' outcome expectancies determine ones' intentions, which has an influential role in the adoption of behaviours in action control (Schwarzer, 1995). However, outcome expectancies may contribute less of a role as problems arise during the adoption of the behaviour. Perceived self-efficacy is a major contributor affecting not only the decision-making process, but also the initiation and maintenance of behaviour. In order to establish a behavioural goal, one must have an appraisal of risk, perceived self-efficacy, and expectations of possible outcomes. The aforementioned factors motivate an older adult to differentiate between appraised and actual risks and process an action appropriately. The use of the HAPA model will justify looking at self-efficacy and risk appraisal. As well, the use of the HAPA model will conceptualize how older adults appraise risk in the intention stage and choose subsequent behaviours in order to understand their accuracy in risk judgment.

Appraisal of Risk

There is heterogeneity among older adults with each appraising fall-risk with different approaches (Ballinger & Payne, 2002; Horton, 2007). Without knowledge of how risk affects decision-making, lessons learned are likely inadequate and thus inaccurate. Thus, appraisal of risk before action can have advantages for effective living. These advantages may include increased awareness of one's surrounding and increased attentiveness to one's capability to perform an activity. The nature of fear and negative portrayal concerning the degree of potential loss contingent on whether injury were to result due to a fall has been highlighted in research (Ballinger & Payne, 2002; Horton, 2007). However, risk alone does not evoke responses of fear. If behavioural responses are to occur, motivational disposition is needed to respond to the associated risk.

Motivation is grounded by ones' beliefs that include: the self, norms, goals, reality and others (Kreitler, 2004). While construction of risk has focused on physical and functional consequences, risk may be a social construction rather than physical in nature and may include the risk of being ostracized and stigmatized in one's local community (Ballinger & Payne, 2002). Beliefs can motivate and regulate older adults' actions and contribute a critical role in exercising control in behaviour (Bandura, 1997). Self-efficacy can be a factor towards gaining knowledge and the development of strategies to construct behavioural patterns (Bandura, 1997). Health professionals are prone to focus on physical safety. However, physical safety is just one component of the entire picture. Moving forward, there is a need to understand to what extent one's appraisal of risk contributes to older adults' actions.

Finucane and Holup's (2006) Risk as Value theory is a dual process model where risk appraisal is a combination of analytic and emotional evaluations (Finucane & Holup, 2006). Values are considered people's best judgements. Finucane and Holup's (2006)

conceptualization of values are that they are a combination of deliberative, affective judgement, and decision processes. An individual's appraisal of risk and benefit evaluations are based on reactions to situational stimuli that can result in irrational and/or rational fears (Finucane & Holup, 2006). Using an analytic approach may be deliberate, where conscious appraisal of a situation may be used to mediate one's behaviour. Appraisal can also be an emotional reaction based on a person's past as opposed to generalized across activities. When both analytic and affective evaluations are congruent, the processes are more likely to combine additively to influence appraisals. Both analysis and emotion "…work in partnership to identify and prioritize experiences that are valued positively (and thus pursued) and experiences that are valued negatively (and thus avoided)" (Finucane & Holup, 2006, p. 145).

On the other hand, "Conditions of incongruence may result in greater analytic or affective processing depending on various factors related to the task, decision maker or context (i.e., analysis may be increased if it is viewed as more reliable, but may be attenuated under time pressure)" (Finucane & Holup, 2006, p. 144). Appraisal of uncertainty paired with lack of situational control is when fear may arise (Finucane & Holup, 2006). However, too much or too little analytic or affective influence can cause a problem, leading to differences in perceived risk. Specifically, when analytic and emotional processing is incongruent, a situation may not be evaluated accurately. For instance, older adults were found to avoid activities they felt that put them in direct risk of falls (Lee et al., 2008). Similarly, Zijlstra et al. (2007) found that when older adults perceived they had poor general health there was a strong independent association with both a fear of falling and avoidance of activity. In these examples, older adults avoided these activities mostly based on the perceived negative consequences of falls other than injury. As a result, affective evaluation

had taken precedence over analytic evaluation that resulted in a contrast of perceived risk. Consequently, if there is an incongruence of appraisal of risk, a misappraisal of the situation may be the resultant and therefore inappropriate actions or lack of action may occur (Finucane & Holup, 2006). Specifically, physical health declines with age, however psychological and emotional health (subjective health) does not decline in the same manner (Chappell & Hollander, 2013). This may result in an incongruence of objective and subjective health, which can present misappraisal of potential fall-risk.

"The key to optimal judgement under conditions of uncertainty is to apply the appropriate evaluation process or combination of processes such that both affective and analytic features of risk information govern risk responses" (Finucane & Holup, 2006, p. 154). It is important for people to clarify what potential negative and positive aspects of a situation are in order to have an accurate sense of risk and therefore action to take. Older adults use different risk evaluations to inform action. Essentially, older adults use an assessment of risk of what they know and have experienced. The acceptability of risk changes with age. Extrinsic factors like home modifications are considered modifiable, whereas intrinsic factors like physiological changes are less modifiable (Horton, 2007). However, risk has been primarily studied exploring the risk factors for the development of fear of falling (Friedman, et al., 2002; Howland et al., 1998; Lach, 2005; Murphy et al., 2002; Roe et al., 2008; Suzuki et al., 2002; Zijlstra et al., 2007) neglecting to explore whether their appraisal of risk is an accurate assessment given their perceived capabilities and perception of risk.

The risk as value model suggests that there are differences in perceived risks that are complex in nature. These differing perceived risks require one to understand how analysis and emotional processes motivate reactions of risk in particular situations (Finucane &

Holup, 2006). The risk as value model will help frame how decision-making differs across older adults living in the community based on their appraisal of their risk of falling. Health behaviour theories have focused on behavioural change where the causal mechanisms that shape intention consequently change one's behaviour or help maintain behaviour (Ballinger & Payne, 2002). Specifically, HAPA will be used to understand the formation of intentions to act through risk perceptions, self-efficacy, and outcome expectancies as well as how one uses both affective and analytic evaluation to inform intentions. Through the aforementioned, the present study attempted to evaluate whether older adults made accurate judgements of risk and understand how they formulate intention to act such as identifying potential fall hazards.

Study Objectives

The present research study explored whether fall-related fall-risk appraisal was situation specific or general. Previous research literature has found that a fear of falling seemed to be generalized across activities. However, this conclusion may be a function of the methodology employed. An indirect approach to understanding fear is to study self-efficacy related to activities of daily living (Li et al., 2003). The present study investigated appraisals of different levels of fall-risk across four fall-related scenarios, as each situation may present a distinctive associated fall-risk to each individual. Another study objective was to examine whether older adult's fall-risk appraisal and balance confidence judgments were accurate.

A greater understanding about older adults' accuracy of risk judgements will enhance fall prevention strategies. This study also investigated key sources of information used by older adults to inform their appraisal of fall-risk. This study sought to investigate how older adult's appraisal of fall-risk rather than the outcome of risk and fear of falling affected risk

judgement and decision-making. Appraised risk may depend greatly on the way in which relevant information is presented. As a result, this research study sought a greater understanding of how older adult's appraised risk based on the relevant information presented using specific scenarios community-dwelling older adults performed regularly to understand appraisal of fall-risk and to understand the dynamic interplay of risk decisions that inform behaviour.

Research questions:

1. Is fall-related fall-risk appraisal general or situation specific?
2. Are older adults' fall-risk appraisals and balance confidence judgements accurate?

Chapter 3: Methods

Epistemological Assumptions

Pragmatism was the overarching worldview used to address the problems in this embedded mixed methods design. Specifically, there are singular and multiple realities that are open to empirical inquiry, which allowed for the research to be unconstrained between post positivism and constructivism (Creswell & Plano Clark, 2011). Pragmatism acknowledges that there are multiple stances where the research includes both biased and unbiased perspectives (Creswell & Plano Clark, 2011). Pragmatism suggests that knowing is always the result of our actions and that knowledge can provide information about possible connections between actions and consequences and human action is considered meaningful (Robert Gray, 2010). The design of this study was aimed to investigate and acquire knowledge through a combination of older adult's objective and subjective knowledge to develop an understanding about how older adults engage with activities of daily living.

Research Design

The research questions in this study were best answered using a combination of quantitative and qualitative (mixed) methods, which provided a better approach than either methodology alone since the "…strengths of one form of research make up for the weaknesses of the other" (Creswell, 2014, p. 15). For example, quantitative research investigated the relationships within data whereas the supplementary use of qualitative research captured the voice of the participants allowing for their experiences to be understood in context to their appraisal of fall-risk. Specifically, the use of a mixed methodology has allowed for diverse approaches to be applied in order to investigate older

adult's appraisal of fall-risk where both subjective and objective aspects are found to affect decision-making and subsequent behaviour.

An embedded correlational mixed methods design has been practical as it allowed the use of both numbers and words to solve a problem and combine inductive and deductive thinking. Specifically, a mixed methods approach provided further evidence for studying the research problem as the researcher has been able to use all tools of data collection available rather than be restricted to one or the other (Creswell & Plano Clark, 2011). Moreover, the purpose of supplementing this study with qualitative data was to attempt to elicit meaning from the participants' appraisals of fall-risk and to build a deeper understanding than a survey would yield. Subsequently, this would generate a pattern of responses that could explain the quantitative data collected better than a traditional quantitative design.

Unlike a convergent mixed methods design, the intent was not to merge the two different data sets collected to answer the research questions, rather, to keep the two sets of results separate and support the data concurrently collected to strengthen the data found in this study (Creswell & Plano Clark, 2011). This decision was made to better understand both data sets. Afterwards, to achieve greater understanding of the quantitative data that was found, the qualitative data was used to support the quantitative data to gain an enhanced understanding of older adult's appraisal of fall-risk and balance confidence. However, sometimes when a researcher concurrently embeds qualitative data, an introduction of bias may occur as a result of the qualitative data collected having an effect on the experiment's internal validity (Creswell & Plano Clark, 2011). For example, if the qualitative questions were asked subsequent to quantitative collection, the effect of recall may have decreased the accuracy of the older adults' responses. As well the effect of collecting qualitative data in the beginning may have introduced a bias that affects older adults' interpretations of fall-risk. In

order to minimize these potential effects in this research study, qualitative data collection was distributed across the interview.

Participants

Thirty community-dwelling older adults (15 female; 15 male) with a mean age of 74.93 years (SD=6.88; range = 65 – 86 years) participated in this study. Eligibility requirements included being male or female, aged 65 years or older, have or have not fallen, are concerned or not concerned about falling, able to walk three meters comfortably (with or without aid), and stand for a few minutes unsupported (two to three minutes to administer the Functional Reach test). The study utilized convenience and snowball sampling techniques in order to recruit participants through the approval of recruitment at the Canadian Centre for Activity and Aging (Appendix A) and older adults living in the community in London, Ontario, Canada using flyers (Appendix B), email, phone, and one on one communication. Study approval was received from the Research Ethics Board at Western University (Appendix C).

Procedures

Participants were interviewed at various sites convenient to them (i.e., the Canadian Centre for Activity and Aging, at their home, on campus at Western University). One data collection session was completed with each participant with a mean time of 44 minutes (SD=16.32; range 30 – 105 minutes). The data collection sessions consisted of three parts: i) the Falls Risk Assessment Questionnaire (FRAQ) developed by Wiens, Koleba, Jones, and Feeny (2006); ii) open-ended questions in conjunction with fall-risk appraisal and balance confidence, hazard identification using four in-home scenarios involving activities of daily living iii); functional tests: the Timed-Up-and-Go test (TUG) (Podsaidlo, Richardson, 1991)

used to quantify basic mobility skills and the Functional Reach test (FR) (Duncan, Weiner, Chandler, & Studentski, 1990) administered to assess participant's margin of stability (see Table 1 for a list of the variables used in this study).

Table 1. List of Variables Used in This Study

Assessment	Measurement
FRAQ	Part I – 22 questions on Falls Risk Part II – 11 questions on Demographic Information
At the present time are you very fearful, somewhat fearful, or not fearful of falling (again) – question	Very fearful/ somewhat fearful/ not fearful
Relative Risk Judgement	Decide which of the two scenarios presented was riskier than the other and asked to provide their justification for the decision.
Absolute Risk Judgement	Decide how much risk in the scenario presented has along a Visual Analogue Scale (0-100mm).
Balance Confidence	Decide how much balance confidence the participant has in the scenario presented using a balance scale of 0% no confidence and 100% completely confident and asked to provide justification for their appraised balance confidence.
Hazard Identification	Identify the number of hazards in the scenario presented (ranging from 2 to 8) and asked to provide justification for their identified hazards.
The Timed-Up-and-Go test (TUG)	Time measured to the nearest one-hundredth of a second.
The Functional Reach test (FR)	Functional reach length was measured to the nearest 0.5 inches.

First, the participant was asked to read and sign the letter of information and consent form (Appendix D). Next, a self-report questionnaire, the FRAQ was completed. The FRAQ Part I consisted of a falls-risk survey and Part II focused on the collection of demographic

information (Appendix E). The researcher was present to assist reading, if necessary, and to address any questions or concerns the participant had about the questionnaire. Next, fear of falling was assessed using the single question, “at the present time are you very fearful, somewhat fearful, or not fearful of falling (falling again)?” This question was asked to be comparable to previous studies, as this has been the most frequently used method of measuring a fear of falling found in the research literature (Allison et al., 2013; Arfken et al., 1994; Lach, 2005; Suzuki et al., 2002). After the participant’s response, the participant was asked to explain their rationalization about why they indicated they were fearful, somewhat fearful, or not fearful of falling by asking them, ‘can you tell me why you are very/somewhat/ not fearful of falling.’ To ensure accuracy and that participants’ answers were captured verbatim the participants were asked to repeat their responses for verification when something was unclear or the researcher reread what the participant had said. This was done for the older adult responses for the single item question, relative risk judgement, balance confidence, and the hazards participants had identified.

Next, the study utilized four fall-risk scenarios (Appendix F) that were created by the researchers and informed by epidemiological data, research studies, and validated through other fall-risk knowledgeable individuals (graduate students, professors, and members of the Ontario Falls Prevention Community of Practice). First risk factors were gleaned from the literature on fall risk factors (CDC, 2013; Gill et al., 2000; Milat et al., 2011; Lord et al., 2007; Stevens et al., 2001). Second, the scenarios were constructed by incrementally adding in risk factors, followed by an extensive review by 15 fall experts that the numbers of risk factors were valid and clear in each scenario. The number of hazards, rather than the type of hazard as well as external hazards rather than internal were used as they were more easily added to the scenarios and applicable to a wider range of older adult’s functionality. As a

result, for the purposes of this study the number of environmental hazards was greater than personal hazards (internal) with the ratio of environmental hazards to personal being 15:5.

Each of the four scenarios had a number of different fall hazards (A: 6, B: 8, C: 4, D: 2) that incrementally ranked the situations from low to high risk based on the number of hazards present in each scenario (Appendix G). The scenarios were each printed on separate pieces of paper using size 18 Times New Roman font to ensure legibility for the older adults participating in this study. However, if the participant had difficulty reading the scenarios, the researcher helped the participant by reading the scenario description for them. Additionally, each scenario was created such that the length of each description was similar across all scenarios. This was done to increase the design quality of the scenarios to decrease the potential affect that the length of the scenario descriptions would bias the participants' risk judgements.

Two aspects of older adult's appraisal of fall-risk were examined: relative risk judgements and absolute risk judgements (Little & Wyver, 2010; Morrongiello & Matheise, 2004). The older adults' relative risk judgements were assessed through their ability to determine which scenario of two presented was thought to have more risk than the other. Participants were shown the scenarios in all of the possible pairings (total of six pairings: AB/BA; AC/CA; AD/DA; BC/CB; BD/DB; DC/CD) randomized using a Latin square (Appendix H), in order to control order effects. Participants were asked to describe why they made the comparative selection they chose for which scenario they appraised with greater risk by asking, 'how did you make your decision for which scenario was riskier than the other' to gain further understanding in their appraisal of risk.

Absolute risk judgement was assessed one scenario at a time by asking older adults to estimate how much fall-risk they appraised to be present in each scenario presented to

them (total of four scenarios: A, B, C, D). Order was randomized again through the use of a Latin square (Appendix H). Participants were asked to use a Visual Analogue Scale (VAS) for absolute risk judgment only consisting of a 100mm line with anchors at either end – no risk and high risk (Appendix I). The older adult was asked to indicate their appraisal of fall-risk by marking a vertical line anywhere along the VAS for each scenario. For absolute risk appraisals, the older adult was not asked to explain their judgement. The researcher later measured the line with a ruler to find the older adult's absolute risk judgement for each scenario.

Next, balance confidence for each scenario was measured. Participants were asked, "How confident are you that you will NOT lose your balance or become unsteady in this scenario? Please indicate your level of self-confidence by choosing a corresponding number from the following scales for each scenario" (Appendix J). Their balance confidence ranged from 0% (no confidence) to 100% (completely confident). Balance confidence was assessed in a similar manner used by Powell and Myers (1995) in their Activities Specific-Balance Confidence (ABC) Scale. After the participants indicated their balance confidence for each scenario they were asked to provide justification for their indicated their level of confidence. This was performed by asking, 'why have you indicated your balance confidence the way you have, and why do you think this is a potential hazard?' This was done to achieve an enhanced understanding of one's balance confidence.

The next part of the study involved the identification of potential hazards in each scenario one at a time. The participants were asked to examine a scenario and to identify any hazard the older adult appraised in that specific scenario that they thought could result in a potential slip, trip or fall. After each hazard was identified, the participants were asked to describe why they thought the hazard was a potential fall hazard being asked 'why have you

indicated your balance confidence the way you have, and why do you think this is a potential hazard?' If the participants simply listed a hazard(s) they were prompted to explain why they thought it was a potential hazard to them. This method was done to gain increased understanding for their identification of hazards in each scenario, as some participants identified hazards that did not match fall-hazards found in the literature (refer to Appendix G for researcher identified hazards). The potential fall hazard and the accompanying description, similar to data collection throughout this interview, was hand written by the researcher.

Lastly, the participants were assessed using the Timed-Up-and-Go (TUG) and the Functional Reach (FR) tests to obtain data on their functional abilities. The TUG test was used to quantify basic mobility skills. The TUG test has high inter-rater reliability (r=0.99) and high intra-rater reliability (r=0.99) and good retest reliability in different settings (Gupta, 2008). Tools used for the TUG included a chair with arms (standard armchair with seat height of 46cm, however, since the interview locations were not consistent, the height of the chair varied), a three-meter walkway, and a stopwatch. The participant wore their normal footwear and used their customary walking aid if needed (n=3). "On the word 'go', the subject got up, walked at their self-selected 'comfortable and safe pace' to a line on the floor three meters away, turned and then returned to the chair again" (Gupta, 2008, p.88). Participants performed three trials for practice followed by two test trials that were averaged to represent their TUG score (Beauchet et al., 2010; Podsiadlo & Richardson, 1991). "A neurologically intact, independently mobile adult has been found to be able to perform the test in less then 10 seconds" (Gupta, 2008, p.88). If an older adult was unable to complete the task within 30 seconds, their risk of falling was then considered to be three times greater than

the average older adult. Overall, the TUG test took approximately two to three minutes to administer for each older adult.

The FR test was administered to assess the margin of stability of the older adults (Duncan, Weiner, Chandler, Studenski, 1990; Gupta, 2008). The FR test has good inter-rater reliability (ICC=0.98) and test-retest reliability (r=0.98) (Gupta, 2008). The FR test included using a measuring tape secured to the wall that was parallel to the ground placed at the level of the participant's shoulder. The participant was asked to stand (their dominant side to the wall) with their feet shoulder width apart and maintain a fixed base of support along the wall with the measuring tape. The participants were then asked to make a fist and extend their dominant arm forward with their shoulder flexed to 90 degrees while not touching the wall and maintaining a fixed base of support in standing position (Gupta, 2008). First, a measurement of their initial reach took place at the end of their third metacarpal with their hand was made in a fist as a reference point on the measuring tape. After this measurement, the participant was asked to reach as far forward as they could without losing their balance or taking a step while not touching the wall, where another measurement was taken from their third metacarpal with their hand still in fist formation. Functional reach was the difference found from the initial measure to the extended reach over the course of five trials where the first two were practice trials and the following three test trials were averaged (Duncan et al., 1990; Gupta, 2008). A score of less than or equal to six inches has been found to be predictive of falls (Gupta, 2008). See Table 2 for Functional Reach test norms found in older adults from the ages 41 to 87 years old. It is important to note that during these functional reach tasks, in case of loss of balance the researcher stood beside the participant to ensure safety throughout testing. The FR tests took two to three minutes to complete with each participant.

Table 2. Functional Reach Norms

Age groups	Men (inches)	Women (inches)
Age 41-69	14.9±2.2	13.8±2.2
Age 70-87	13.2±1.6	10.5±3.5

Note: Adapted from *Measurement Scales Used in Elderly Scales*, p. 77, by Gupta, 2008, Oxford: Radcliffe Publishing

The ordering of the procedures from first to last was the same for all participants. The order of procedures from first to last was: the FRAQ, the fear of falling question, relative risk, absolute risk, balance confidence, identifying fall hazards, and lastly the two functional. The order allowed for minimal bias effects that could influence each data collection step. Both quantitative and qualitative data were collected concurrently such that the supportive data (qualitative) would supplement the primary data (quantitative) and not have increased potential bias compared to if the qualitative data was collected before and/or after. This provided the older adult the ability to freely describe their thoughts and their decision-making processes when appraising fall-risk without the potential affect of recall or pre-framed knowledge.

Data Analysis

Data analyses were completed using Microsoft Excel, Statistical Package for Social Sciences (SPSS), and qualitative narrative analysis. The study utilized a combination of descriptive and inferential statistics since the sample size was small (n=30). For the purposes of this study only the FRAQ part II (participant's demographic information) was used. The FRAQ part I was used so that the older adults could begin thinking about appraisal of fall-risk and was not used as data in this study.

Quantitative analysis was performed using Pearson Product Moment correlation analyses to describe the strength of the relationships among the absolute risk judgments across the four scenarios. A similar analysis was used for the relationships among the balance confidence scores across the four scenarios. Stepwise multiple regressions were used to investigate whether absolute risk judgement scores could be predicted using age, number of hazards identified, TUG scores, and balance confidence. Similarly regressions were run to see whether balance confidence scores could be predicted by age, number of hazards identified, FR scores, and absolute risk judgements. Statistical significance for this study was $p<0.05$. See Table 3 for further clarification.

The qualitative analysis portion included were participant's answered open-ended questions to provide their experience without constraints to explore the central phenomenon of older adults' appraisal of risk. The participants' responses were documented at the time of the interview with field notes and later transcribed. The data was conceptualized, coded, and categorized in a manner to link the research from one idea to another and to identify potential patterns that evolved from participants' responses (see Table 3 for qualitative data outcomes).

Table 3. Quantitative and Qualitative Data Analysis Outcomes

Research Question	Quantitative	Qualitative
1. Is fall-related fall-risk appraisal general or situation specific?	Pearson product moment correlations among absolute risk judgement and balance confidence scores	Fear of falling question responses
		Balance confidence responses
2. Are older adults' fall-risk appraisal and balance confidence judgements accurate?	Number of hazards indentified compared to actual number of hazards in each scenario	Incorrect relative risk judgment responses
	Relative risk judgement and absolute risk judgement scores (number of correctly appraised risk judgments compared to actual number of hazards)	
	Multiple regressions for absolute risk judgement (predictors: identified hazards, TUG scores, balance confidence scores, and age) and balance confidence judgements (predictors: identified hazards, FR scores, and age)	

The two researchers (masters supervisor, Dr. Alan Salmoni and masters student, Parinha Karen Simmavong) had individually become familiarized with the data through review of the transcripts. They individually coded the data to identify themes before pulling apart the data to meaningfully put it back together. The researchers used content analysis to develop categories of words and phrases, later looking at the frequency of the word to identify and tentatively name the conceptual categories found in the data by each researcher. The researchers later discussed and came to a consensus over the codes to legitimize them through evaluating alternative explanations and re-examining the codes to understand and

gain perspective of a bigger picture of the phenomenon. After a second round of coding, examinations of the relationships occurred to develop a pattern to provide a conceptual model for the quantitative data collected.

Research Question 1: Is fall-related fall-risk appraisal general or situation specific?

To determine whether fall-risk appraisal was situation specific or general, absolute risk judgement scores as well as balance confidence scores were examined. Specifically, if risk appraisal was generalized across hazards/scenarios then there should be high positive correlation for each risk scenario pairing (six possible pairings). However, if appraisal is hazard/scenario specific then the correlations should be low across the six pairings. Pearson Product Moment correlations were calculated for the absolute risk judgements of scenario pairings AB, AC, AD, BD, BC, CD). These six correlations (r) were converted to z scores, summed and averaged, and then converted back to a correlation. The same process was performed with the participants' balance confidence scores.

Additionally, the older adults' answers to the fear of falling question and their reasoning as to why they rated their balance confidence for the scenarios as they did were also considered when determining whether fall-risk appraisal was general or if it was specific to situations. Examinations of balance confidence descriptions were used to identify the generality or specificity of older adult's appraisal of fall-risk. Participants were considered to appraise their balance confidence generally if they indicated a generalized explanation for their appraisal of risk for the scenarios. If participants appraised their balance confidence based on specific measures for the four scenarios, participants were considered to appraise their balance confidence specifically.

Research Question 2: Are older adults' fall-risk appraisals and balance confidence judgements accurate?

Four measures of accuracy were used and analyzed. First, the hazards identified by older adults were examined. Specifically, the number of hazards the older adults were able to identify compared to the total number of researcher identified hazards was compared. Additionally, the hazards identified and not identified will further the understanding about older adult's accuracy of fall-risk.

Secondly, accuracy of relative risk judgement was investigated. The older adult had indicated relative risk by identifying which of a pair of scenarios had more risk than the other. The ability of the older adult to correctly identify which scenario had greater risk (n=180) was analyzed by dividing the correct appraisal of relative risk with the overall number of relative risk judgements. To gain an enhanced understanding of older adults' relative risk judgements, the researcher coded the explanations given by the older adults for incorrect judgements. This was used to supplement the relative risk judgment findings to obtain data as to why older adults made the judgements in the manner they did.

Thirdly, older adult's absolute risk appraisal was then analyzed to see if they had correctly appraised the risk in the scenario. This was done by comparing the older adult's absolute risk judgement scores ordering of the four scenarios compared to the ordering expected based on the number of hazards present. If any of the scenarios were ranked out of order they were considered inaccurate. When the participants ranked a scenario with the same absolute risk judgement, the same ranking order was applied to both, which was a similar method performed by Little and Wyver (2010).

Fourthly, multiple regressions were computed in SPSS to predict the absolute risk and balance confidence scores for each scenario separately. The older adults' absolute risk scores

(dependent variable) were analyzed with the following four independent variables for each specific scenario: 1) identified hazards, 2) Timed-Up-and-Go scores, 3) balance confidence scores, and 4) the participants' ages. The older adults' balance confidence scores (dependent variable) were analyzed with the following four independent variables: 1) identified hazards, 2) Functional Reach scores, 3) absolute risk judgement scores, and 4) the participants' ages. Interpretation of the output from the multiple regressions began with checking assumptions. First, the independent variables were checked to ensure there was at least some relationship with the dependent variable. Colinearity was evaluated through the Tolerance score (indicator of how much variability of the specified independent was not explained by the other independent variables; if less than 0.10 – possible multicolinearity) and Variance inflation factor (VIF; if above 10 – possible multicolinearity) (Pallant, 2013). Moreover, the data was inspected for outliers, normality, linearity, and homoscedasticity of residuals. This was done through inspection of the Normal Probability Plots (P-P) of the Regression Standardized Residuals (points should lie reasonably in a straight diagonal line suggesting no major deviations from normality) and the Scatter plot (residuals should be roughly rectangular shape found evenly distributed in the center) (Pallant, 2013).

Chapter 4: Results

Descriptive Results

Thirty community-dwelling older adults (15 male; 15 female) completed the study. The interviews conducted with the participants ranged from 30 to 105 minutes (M=44 minutes, SD=16.32) and were completed at the Canadian Centre for Activity and Aging, at the participants' home or on campus at Western University. Interviews were conducted between the months of November 2014 and January 2015.

Demographic characteristics of the participant sample can be found in Table 4 The participants' ages ranged from 65 years to 86 years old (M=74.93 years, SD=6.88). An equal number of females (n=15) and males (n=15) were tested. Most participants lived in a house (87%), their self-reported health was good (90%), and they were generally well educated, having a high school education or above (those with a university degrees n=15). Sixteen participants (53%) reported their distance of walking to be unlimited, able to walk one to ten blocks (33%), and less than a block (13%) with few using an assistive device (10%). Some participants (37%) reported experiencing at least one fall in the previous twelve months and most (86%) older adults reported a fall history, having fallen at some time in the past.

The number of self-reported medications taken by the participants ranged from zero to twelve (M=2.9; SD=2.56). The specific self-reported medications have not been included in the results, as many participants did not know the names of their medications, suggesting a high level of trust with their physicians. The number of self-reported chronic conditions identified by older adults ranged from one to five (M=2.06; SD=1.05).

Table 4. Characteristics of Older Adult Participants (FRAQ part II Demographic Information)

Characteristic	Participants (n=30)
Age (mean ± SD)	75 ± 6.88 years (range 65 – 86)
Gender	
Female	15 (50%)
Male	15 (50%)
Living accommodation	
House	26 (87%)
Apartment or condominium	4 (13%)
Self-reported health status	
Very good, or excellent	21 (70%)
Good	6 (20%)
Fair or poor	3 (10%)
Self-reported distance able to walk	
Unlimited	16 (53%)
1-10 blocks	10 (33%)
Less than 1 block	4 (13%)
Assistive walking device required	3 (10%)
Have fallen in the past at any time	26 (87%)
Have fallen in the past year	11 (37%)
Highest level of education completed	
High school	9 (30%)
Non-university degree	4 (13%)
Partial University	2 (7%)
Undergraduate degree	8 (27%)
Graduate degree	7 (23%)
Number of medications (mean ± SD)	2.9 ± 2.56 (range 0 – 12)
Number of chronic conditions (mean ± SD)	2.06 ± 1.05 (range 1 – 5)
Arthritis or rheumatism	8 (27%)
Osteoporosis or Osteopenia	8 (27%)
High blood pressure	12 (40%)
Heart disease	5 (17%)
Cancer	3 (10%)
Diabetes	5 (17%)
Effects of stroke	2 (7%)
Bladder or bowl incontinence	4 (13%)
Difficulty hearing	5 (17%)
Cataracts	2 (7%)
Glaucoma	4 (13%)
Alzheimer's disease	1 (3%)
Parkinson's disease	1 (3%)
Other	2 (7%)

When tested for the TUG, the older adult's range of time was between 4.29 to 22.44 seconds (M=8.77, SD=3.47). Older adults that performed this test in greater than 10 seconds (n=6) were considered at greater risk of falls (Gupta, 2008). Additionally the FR scores ranged from 2.67 to 16.83 inches (M=10.63, SD=3.75). A score of less than or equal to six inches (n=4) was considered predictive of falls (Gupta, 2008).

Research Question 1: Is fall-related fall-risk appraisal general or situation specific?

Absolute risk judgement.

The participants' absolute risk judgements for the four scenarios varied in the study based on their appraisal of fall-risk (see Table 5) and were found to be in the correct order of risk based on the number of hazards present in the scenario, however it is important to note that scenario A (55mm) and C (50mm) were appraised with almost similar absolute risk.

Table 5. Means and Standard Deviations for Absolute Risk Judgement for Each Scenario

Scenario (# of hazards present)	M (mm)	SD
A (6)	55	26
B (8)	79	24
C (4)	50	26
D (2)	33	19

To determine the generality of fall risk appraisals six correlations were computed for the six possible scenario pairings (see Table 6). Based on an average correlation of r=0.305, it seems risk appraisals were specific in nature. Squaring the average correlation and

multiplying by 100 suggests that only 9.30% of the variance in risk appraisals was general across the four different scenarios.

Table 6: Absolute Scores Correlations: Transformation of r to z

Scenarios	Correlation (r)	z score	Average z	z score to r
AB	0.2448	0.250	0.3142	0.305
AC	0.1499	0.151		
AD	0.2938	0.304		
CD	0.4190	0.448		
BC	0.3129	0.326		
BD	0.3844	0.406		

Balance confidence.

The participant's balance confidence for the four scenarios varied across scenarios (see Table 7). The scenario with the lowest balance confidence was found to be scenario B (44). For scenarios A (69) and C (64), participant's balance confidence was out of order based on risk in the scenario due to the number of hazards present in the scenario where balance confidence in scenario A should have been less than scenario C due to more hazards.

Table 7. Means and Standard Deviation for Balance Confidence for Each Scenario

Scenario (# of hazards included)	M (%)	SD
A (6)	69	26
B (8)	44	26
C (4)	64	23
D (2)	76	22

When comparing absolute risk appraisal to the balance confidence scores it is interesting to note that some participants had described contradicting appraisals of risk and balance confidence scores. For example, balance confidences in scenario A and C as seen previously. Also, those who appraised scenario B to have the highest absolute risk indicated they had relatively high (rather than low) balance confidence in that same scenario because as they suggested they were more aware of the risk, thus taking greater precautionary action. For example, participant 5 (82 year old male) marked scenario B at an absolute risk level of 91 out of 100 mm but indicated their balance confidence was 60 (out of 100). Participant 5 suggested, "I am more aware of the risk in the washroom situation. I have slipped before in the washroom. I am more confident I won't fall or lose my balance because I am more proactive in what I am doing." Similarly, participant 23 (70 year old female) marked scenario B with an absolute risk level of 87 out of 100 mm but their indicated their balance confidence to be 90 (out of 100). Participant 23 replied, "I'm aware of the danger and if I don't think about it I could slip." The Pearson Product Moment correlation between absolute risk and balance confidence scores for scenario B was the strongest relationship (r=-0.28) (see Table 8).

Table 8. Pearson Product Moment Correlations of Absolute Risk Judgement and Balance Confidence Scores

Scenario (# of hazards included)	Absolute Risk Judgement M (mm)	Balance Confidence M (%)	r
A (6)	55	69	-0.20
B (8)	79	44	-0.28
C (4)	50	64	-0.16
D (2)	33	76	-0.01

Similar to absolute risk judgements, to determine the generality of balance confidence a total of six scenario pairings were investigated (see Table 9). Again, a relatively low average correlation (r=0.360) was found. As a result, only 12.96% (r^2 x 100 = 12.96%) of the variance in balance judgements was general across the four scenarios.

Table 9. Balance Confidence Scores Correlations: Transformation of r to z

Scenarios	Correlation (r)	z score	Average z	z score to r
AB	0.4467	0.485	0.3757	0.360
AC	0.1648	0.167		
AD	0.5210	0.576		
CD	0.2317	0.234		
BC	0.4245	0.460		
BD	0.3163	0.332		

Participants were asked directly after they determined their balance confidence for each scenario (Appendix M), why they had indicated their balance confidence the way they had. Most (70%) participants had specific reasoning for each scenario.

> Participant 5 (82 year old male) indicated specific reasoning for their appraisal of risk in the washroom: “I am more aware of the risk in the situation. I have slipped before in the washroom. I am more confident I won’t fall or lose my balance because I am more proactive in what I am doing.”

Participant 19 (71 year old male) responded with specific reasoning for their appraisal stating, “I think it’s a risk analysis. I don’t fall in the house, but there are times I lose balance if I were in this situation with the experience I have. The experience of the moment we’ve been there. You perceive the risk and we’re more careful. Scenario B you see the risk so you’re more careful. Anything I can deal with and haven’t loss balance. I am more confident versus lower or less. It’s the ability to perceive potential problem and your experience in the past. It’s a risk assessment of your own life. Back to the ladder idea, when I was 40 I could go up easily, but now I come down more carefully and get up two feet on the rung than one at a time. It’s about realizing your own limitations and your past experience.”

Participant 4 (75 year old female) and 5 (82 year old male), responded with more general reasoning towards their balance confidence replying, “aware of the situation, but I know the possibility” and “I am more confident in those situations.”

Participant 30 (84 year old male) identified more general reasoning and suggested that, “I just don’t worry about it and I have been doing all these things for years.”

Fear of falling.

Data provided by participants were put into the categories of either very and somewhat fearful or not fearful of falling. It was found that 3% (n=1; male=1) of participants were very fearful of falling, 37% (n=11; male=6, female=5) were somewhat fearful of falling, and 60% (n=18; male=8, female=10) were not fearful of falling. From their

responses, the older adults each provided reasoning as to why at the present time they were very fearful, somewhat fearful or not fearful of falling (Appendix N).

Five codes emerged from participants who were very and somewhat fearful (see Table 8) and four codes emerged for non-fearful participants (see Table 9). It is important to note that both fearful and non-fearful participants associated their use of being careful to explain their fear/non fear. However, while both groups of participants used the reasoning of carefulness, both parties use of it differed in its meaning. Specifically, the fearful participants' described care more reactively (i.e., negative consequences) versus participants who were not fearful expressed their use of care more proactively to prevent falls

Table 10. Codes for Very/ Somewhat Fearful Participants' Responses

Codes	Very/ Somewhat Fearful (n=19)	Total (100%)
Personal Condition	5	26%
Aware of risk factors	4	21%
Previous fall	2	11%
Aware of fall consequences	4	21%
Careful	4	21%

Table 11. Codes for Not Fearful Participants' Responses

Codes	Not fearful (n=27)	Total (100%)
Uses prevention:		
a) Caution	10	37%
b) Exercise	3	11%
Good balance/ good health	6	22%
'Not fearful'	4	15%
Fall experience	4	14.81%

Participants that indicated they were very and somewhat fearful participants' responses presented patterns of situational awareness and external factors from themselves.

> Participant 1 (82 year old male), who indicated they were very fearful of falling suggested, "My balance isn't good, especially outside. Inside is good because there is always something I can reach. I am very careful and use my cane."

> Participant 19 (71 year old male), who indicated they were somewhat fearful explained, "It's always in the back of my mind, especially if there's an issue. There's a risk assessment to be considered. In normal activity I don't think about it much since risk is low, but when I have to get up on a ladder and clean the eaves trough I have some hesitation. It really depends on what needs to be done. Like the eaves trough or going on a ladder."

Conversely, the not fearful participants presented a pattern of prevention strategies and sense of control.

> Participant 18 (72 year old female), who indicated they were not fearful of falling said, "Because I play tennis two times a week and I go to a yoga class once a week. I try to take my time going down the stairs and slow down. One of my closest friends fell down the stairs and landed on her foot through the wall. It took her a whole year to recover."

> Participant 3 (74 year old male), who indicated they were not fearful of falling articulated, "Falling doesn't happen to me, not anymore than I would. It's not a

concern to me- I feel sturdy on my feet, I don't feel my age has made me scared anymore than an ordinary person."

A main overall pattern found in both participant categories (very, somewhat versus not fearful of falling) was the use of care and increased caution.

Participant 10 (82 year old female), who indicated they were somewhat fearful of falling replied, "That's why I take care- I wear certain shoes and am mindful of ice and snow. I am quite aware of it and I watch for that."

Participant 12 (79 year old male), who indicated they were not fearful of falling stated, "I am not fearful, but careful. I try to be aware of the situation. When I was younger I could do things – I am less confident of balance on one leg now and have a diminished sense of balance. When you are aware of your limitations you are more concerned with the potential of losing balance. I always try to have something within reach."

Research Question 2: Are older adults' fall-risk appraisals and balance confidence judgements accurate?

Hazards identified.

Across all participants and scenarios a total of 361 (60%) fall hazards were identified out of the 600 possible (20 hazards x 30 participants). The average number of fall hazards

identified by a participant was 12 (SD=4.38; 60%) (see Table 12). Most of the older adults were not able to identify all of the potential fall hazards.

Table 12. Total Hazards Identified for Each Scenario

Scenario (# of hazards included)	Total Hazards Identified	Total (%)
A (6)	120 out of 180	67%
B (8)	135 out of 240	56%
C (4)	72 out of 120	60%
D (2)	34 out of 60	57%

Fall hazards that were most frequently identified were the dog (n=28), old slippers (n=22), water on the floor (n=27), loose bath mat (n=25), sleeping pill (n=26), no lights on (scenario C: n=23, scenario D: n=21). Least frequently identified fall hazards were the hot shower (n=6), clothes on the floor (n=2), and being tired (n=4). A small number of hazards were identified that were not part of the constructed scenarios (other), which included the distance to the chair and distracted to go to the washroom (scenario A: n= 6, scenario D: n= 3) (see Table 13).

Table 13. Frequency of Hazards Identified In Each Scenario

Scenarios	Hazards identified	Total n (%)
A	Old slippers	22 (73%)
	Holding glass of water	18 (60%)
	In a hurry	20 (67%)
	Coffee Table	13 (43%)
	Rug	13 (43%)
	Dog	28 (93%)
	Other (distance to the chair)	6 (20%)
B	Hot shower	6 (20%)
	Bathtub Ledge	20 (67%)
	No grab bars	20 (67%)
	Water on the ground	27 (90%)
	Ceramic tile	19 (63%)
	Loose bath mat	25 (83%)
	No glasses on	16 (53%)
	Clothes on floor	2 (7%)
C	Sleeping pill	26 (87%)
	No lights on	23 (77%)
	Stair case	12 (40%)
	Tired	4 (13%)
	Other (carpeted-slippery/irregular surface)	7 (23%)
D	3:00 am (middle of night/ drowsy)	10 (33%)
	No lights on	21 (70%)
	Other (distracted to go to the washroom)	3 (10%)

Relative risk judgement.

Out of 180 total relative risk judgements, the majority of the time participants were able to discriminate accurately (see Table 14) between scenarios of greater and lesser risk (relative risk judgement) when scenarios were presented two at a time, with an overall accuracy of 80% (n = 143).

Table 14. Accuracy of Participants' Relative Risk Judgements

Scenario	Accuracy of relative risk judgements (n=143)
AB/BA	23 (77%)
AC/CA	20 (67%)
DC/CD	20 (67%)
BC/BC	27 (90%)
AD/DA	24 (80%)
BD/DB	29 (96%)

Of the six different pairings, participants' relative risk judgements that were most incorrectly appraised were scenarios AB/BA and DC/CD with both having 27% (n = 10), followed by AB/BA with 19% (n = 7), AD/DA with 16% (n = 6), BC/CB with 8% (n = 3), and BD/DB with 3% (n = 1). The most incorrectly appraised scenario pairings (AB/BA and DC/CD) occurred when the two scenarios to be judged were similar in risk (i.e., A: 6 hazards vs. B: 8 hazards; D: 2 hazards vs. C: 4 hazards).

After qualitative data was obtained where participants were asked to make relative risk judgements were made and asked to provide justification. A total of 37 out of 180 (21%) relative risk judgements were found incorrectly appraised (Appendix O). Specifically, the focus on the incorrect appraisals of relative risk judgement provided an understanding as to what may be driving their estimate of risk. Factors found to lead to inaccuracies can be found in Table 15 Some responses were coded under multiple codes (total codes=48) as their responses were complex and identified multiple explanations.

Table 15. Factors Found to Contribute to Inaccurate Risk Appraisal

Scenarios	Incorrect decision	Factor (n=18)	Total (n=48)
AB/BA	A	More hazards identified	2
		A specific hazard identified as particularly risky	
		a) dog	4
		b) glass of water	2
		Increased caution in other scenario	1
AC/CA	C	Specific hazard	
		a) stairs	5
		b) no lights on	4
		c) medication	2
		Previous fall	1
DC/CD	D/Neither	Specific hazard	
		a) no lights on	5
		b) groggy	3
		'I do these all the time'	6
BC/CB	C	Specific hazard	
		a) stairs	1
		b) no lights on	1
		c) medication	2
AD/DA	D	Specific hazard	
		a) no lights on	5
		b) groggy	2
		'I do this all the time'	1
BD/DB	D	Previous fall	1

Common reasoning for the participations' decisions was the identification of a specific hazard identified as particularly risky (i.e., dog, old slippers), the situation (i.e., going upstairs, medication that makes one drowsy, no lights on - dark, or the participant suggested they were more careful in the comparison situation, holding a glass), and previous experience. Thus even though scenarios were ranked incrementally with fall-risk hazards,

some hazards were identified by participants to have greater effect on their appraisal of fall-risk (i.e., no lights on).

Absolute risk judgement.

The overall averages found on the Visual Analogue Scales indicated by the participants were as follows: scenario A with 55 (SD=25.69), scenario B with 79 (SD=23.93), scenario C with 50 (SD=26.27), and scenario D with 33 (SD=19.06) (Appendix N). Out of 120 total absolute risk judgements, almost half of the participants (see Table 16) were able to appraise the severity of fall-risk that may result from the specific scenario in the correct order, with an overall accuracy of 49% (n=59).

Table 16. Absolute Risk Judgement Accuracy for Scenarios

Scenario (rank according to least risk to most risk 1 - 4)	Correct (n=59)	Total (%)
A (3)	8	27%
B (4)	24	80%
C (2)	10	33%
D (1)	17	57%

Note: The number of correctly judged scenarios represented the numbers in the 'Correct (n=59)' column (i.e., only 8 people had scenario A ranked as third most risky (3)).

Absolute risk appraisal for each of the four scenarios was analyzed using multiple stepwise regressions. None of the models violated multicolinearity assumptions (see Table 17). All Normal Probability Plots (P-P) of the Regression Standardized Residual points aligned reasonably closely to the diagonal line with no major deviations from normality. Also, for the most part the scatter plots were evenly distributed with no patterns.

Table 17. Means, Standard Deviations, and Intercorrelations for Absolute Risk Judgement for Scenario C and Predictor Values

Variable	M	SD	1	2	3	4
Absolute Risk Judgement	50.000	26.083	0.566	-0.047	-0.157	-0.334
Predictor Variable						
1. Hazards	2.433	1.104	--	-0.090	-0.003	-0.276
2. TUG	8.774	3.472		--	0.194	0.306
3. Balance Confidence	64.000	23.722			--	-0.114
4. Age	74.966	6.845				--

There were small to medium, positive correlations between the independent variables and the dependent variables (see Table 18). Since this population was small (n=30) the adjusted coefficient of determination value may have greater value when considering the strength of the relationship and its variance.

Table 18. Regression Analysis Results for Absolute Risk Judgement and Predictors

Scenario	r^2	Adjusted r^2	Significance
A	0.142	0.005	0.408
B	0.255	0.136	0.106
C	0.398	0.302	0.010*
D	0.156	0.021	0.354

Note: All coefficients significant at <0.05*

The only multiple linear regression that was significant was scenario C (f=4.14; p=0.01). The only significant predictor was the older adults' identified hazards (p=0.004) (see Table 19).

Table 19. Absolute Risk Judgement Independent Variable Coefficients for Scenario C

Independents	β	Significance
Identified Hazards	0.506	0.004*
TUG	0.117	0.492
Balance Confidence	-0.207	0.210
Age	-0.254	0.153

Note: Coefficients significant at <0.05*

Balance confidence.

The participants' balance confidence for the four scenarios varied. When asked, "How confident are you that you will NOT lose your balance or become unsteady in each scenario the following average scores were found: scenario A(6): 69 (SD=26.09), B(8): 44 (SD=25.95), C: 64 (SD=23.32), D: 76 (SD=22.20).

Similar to the absolute risk judgement multiple regressions, balance confidence for each of the four scenarios was analyzed using multiple stepwise regressions. None of the models violated multicolinearity assumptions (see Table 20). All Normal Probability Plots (P-P) of the Regression Standardized Residual points aligned reasonably closely to the diagonal line with no major deviations from normality and scatter plots were evenly distributed with no patterns. Statistical significance was only found for scenario A (f=3.325; p=0.026) in the balance confidence model.

Table 20. Means, Standard Deviations, and Intercorrelations for Balance Confidence for Scenario A and Predictor Values

Variable	M	SD	1	2	3	4
Balance Confidence	68.667	26.094	-0.107	0.321	-0.200	-0.527
Predictor Variable						
1. Hazards	4.033	1.586	--	0.118	0.229	-0.257
2. FR	10.639	3.747		--	0.090	-0.502
3. Absolute Risk	54.767	25.694			--	0.185
4. Age	74.967	6.845				--

There were small to medium, positive and negative correlations between the independent variables and the dependent variables (see Table 21). Again, since this population was small (n=30) the adjusted coefficient of determination value may have greater value when considering the strength of the relationship and its variance.

Table 21. Regression Analysis Results for Balance Confidence and Predictors

Scenario	r^2	Adjusted r^2	Significance
A	0.347	0.243	0.026*
B	0.260	0.141	0.099
C	0.087	-0.059	0.668
D	0.058	-0.093	0.817

Note: All coefficients significant at <0.05*

The only significant predictor of balance confidence was the older adult's age for scenario A (see Table 22).

Table 22. Balance Confidence Independent Variable Coefficients for Scenario A

Independent	β	Significance
Hazards	-0.243	0.177
FR	0.085	0.662
Absolute	-0.053	0.768
Age	-0.538	0.014*

Note: Coefficients significant at <0.05*

Chapter 5: Discussion

Significance of Study

The objective of this research was to gain a clearer understanding of how older adults appraise their risk of falling during activities of daily living. Previous fear of falling research suggested that this process may be general in nature. These studies (Arfken et al., 1994; Bertera & Bertera, 2008 Cumming et al., 2000; Delbaere et al., 2004; Friedman et al., 2002; Murphy et al., 2002; Vellas et al., 1987; Yardley & Smith, 2002; Zijlstra et al., 2007) have shown that older adults reporting a fear of falling also reported a general decrease in activities. In reaction to these studies, the purpose of the present research was to investigate whether older adults' fall-risk appraisals were general or specific and whether their appraisals were accurate. To study these questions older adults were asked to judge their fall-risk and their balance confidence in four different scenarios that varied in the number of fall-risk factors present in each. It was hoped that by clarifying the nature of older adults' fall-risk appraisals researchers and health care consumers could gain a better understanding of what influences older adult's decision-making and subsequent actions, which in turn could be used to improve falls prevention strategies.

Research Question 1: Is fall-related risk appraisal general or situation specific?

In the present study 40% (n=12) of the older adults reported being somewhat or very fearful of falling. This finding is similar to that found in Boyd and Stevens (2009) with 36%, Cumming et al. (2000) with 26%, and Zijlstra et al. (2007) with 54% of their participants reporting being fearful of falling. Across studies, fear of falling has been found to vary

between 26% to 79% of older adults (Arfken et al., 1994; Gaxatte et al., 2011; Howland et al, 1993; Lach, 2005; Murphy et al., 2002; Powell & Myers, 1995; Suzuki et al., 2002; Zijlstra et al., 2007). The inconsistency across studies may be due to the age of populations studied, the method used to measure fear of falling, or due to the diverse population of older adults. Research should consider that the single item question, 'are you afraid of falling,' requires participants to make a generalized judgement and does not allow them to be situation specific. As a result, finding that a (general) fear of falling is correlated with a general activity avoidance, as found in several studies (Bertera & Bertera, 2008; Lach 2005), is neither conceptually nor practically useful if the goal is to prevent falls in activities of daily living.

The results found in this study are more in line with the Health Action Process Approach Model (Schwarzer, 1995). This model suggests that motivation (decision-making) uses both affective and analytic evaluation to inform intentions to act. Specifically, Schwarzer (1995) suggested that there needs to be confidence in appraisal of risk and most importantly confidence in expectancies that can be affected by perceived and actual environments. As the Health Action Process Approach Model might predict, the present research found that risk appraisal was situation specific and was not generalized across different scenarios, as a general question about fear of falling might lead us to believe is the case. Risk appraisals were found to only have 9.30% of the variance in risk judgements general across the four different scenarios. Similarly, only 12.96% of the variance in balance confidence judgements were general across the four scenarios. These findings suggest that fall-risk appraisal and balance confidence, rather than being generalized across different situations are specific in nature. Therefore, it is unlikely then that older adults avoid activity in all situations. Rather their actions, including avoidance appear to be situation specific.

From a practical perspective it would be informative to know the specific scenarios for which older adults may avoid being active and those for which they are not. In conjunction with this it would be important to know whether older adults' appraisals of risk and confidence are accurate and on what basis are these judgements made.

Research Question 2: Are older adults' fall-risk appraisals and balance confidence judgements accurate?

In comparison older adults' relative risk appraisals were more accurate (79.44%) than their absolute risk appraisals (49.5%). This finding is similar to that found in the children's literature that has looked at risk appraisal and outdoor play (Hillier & Morrongiello, 1998; Little & Wyver, 2010; Morrongiello & Matheise, 2004). Children's relative risk judgement was judged based on three different activities (bicycle, swing, slide) with three levels of risk (no risk, medium risk and high risk). Little and Wyver (2010) found that for all activities the children were 85% and 74% able to identify no risk and risk situations and 56% were accurate in high risk situation risk judgement. Even at a young age, people are capable of making accurate risk judgements, particularly in a relative judgement setting. When older adults in the present research were asked to identify the fall hazards in each scenario, 60% were identified. However, some fall hazards that typically were not identified by the older adults include: hot shower (only six out of 30 people participants identified this as a fall hazard), clothes on the floor (two out of 30), and being tired (four out of 30). This may have resulted from potential desensitization towards those specific risks since the activities were part of typical indoor activities performed frequently on a day-to-day basis (Stevens et al., 2014) and may have been perceived as modifiable. Also, older adults in this study were found to focus on a specific hazard where they overlooked other hazards that could lead to a

potential fall. These findings suggest that risk factor training may be an important safety practice for community-dwelling older adults. Specifically, while older adults' accuracy of fall-risk appraisals may be good, the results show that it could also be improved.

Only two of the regressions were statistically significant out of the eight performed (scenario C for the absolute risk model and scenario A for the balance confidence model). The regression for scenario C showed that 26% ($r=0.506$, $p=0.004$) of the variance found in absolute risk appraisals could be explained by differences in the number of hazards identified. The regression for scenario A showed that 29% ($r=0.538$, $p=0.014$) of the variance found in balance confidence scores could be explained by differences in age. The regression results suggest that judgements are not made on the basis of physical capability, as TUG and FR scores were not found to be significant predictors of risk appraisal or balance confidence respectively. The qualitative results shed light on explaining risk appraisal and balance confidence judgements. While judgements of older adults were fairly accurate, the accuracy and inaccuracy seems to have come from a specific focusing on a single factor (see Table 13). In addition, there was specificity not only in the judgements, but also in the people making these judgements.

The participants' risk appraisals were predominantly focused on one specific hazard. For example, for scenario A the dog was the key source of information used by the participants to appraise their relative risk. This single-factor focusing also led to scenarios being ranked incorrectly (see Table 14). As another example, the hazard of no lights on ($n=15$ out of 48 codes) had a strong effect on the appraisal of risk in multiple comparisons of scenarios CA/AC, DC/CD, BC/CB, and DA/AD. This finding was similar to that found in the children's literature studies by Hillier and Morrongiello (1998) and Morrongiello and Matheise (2004). Hillier and Morrongiello (1998) had suggested that for situations of risk, it

was not a matter of the risk factors present, but rather the type of risk factor that had the greatest impact on their appraisal of risk. Similarly, Morrongiello and Matheise (2004) suggested that emotion-based factors were important contributory factors to risk-taking decisions. These findings suggested why in this study the participants may have appraised their risk in a situation based on one particular factor that had greater precedence over the other factors found in the scenarios. The findings where the participants were found to focus on a specific hazard (i.e., the dog and no lights on) may be the result of the level of perceived risk in the identified hazard. For example, the unpredictability of both the dog and having no lights on could add greater appraised risk in a scenario than a static hazard that does not change and is therefore appraised with less risk.

The results of the present study also support the risk as value theory (Finucane & Holup, 2006) where judgement processes are a combination of both analytic and emotion based risk judgements that does not rely heavily on one's physical ability or the number of hazards in a specific situation. While hazards and risk can be incrementally increased, subjective appraisal of risk may have a greater influence on decision-making. For example, the aforementioned frequently mentioned specific hazards, the dog and the light are a different types of hazards, which may be why they were appraised differently from the other hazards in the scenarios. This difference may be based on the unpredictability of the hazards in comparison to the static hazards.

It is worth highlighting the process and assumption upon which the scenarios were constructed. As previously stated, risk factors were gleaned from the literature on fall risk factors (CDC, 2013; Gill et al., 2000; Milat et al., 2011; Lord et al., 2007; Stevens et al., 2001). The scenarios were then constructed by incrementally adding in risk factors, followed by an extensive review by 15 different fall experts to validate the numbers of risk factors.

Based on literature, the assumption was made that as the number of risk factors increases the probability of falling also increases (Bleijlevens et al., 2010; Connell & Wolf, 1997; Gill et al., 2000; Lord et al., 2007; Milat et al., 2011; Nachreiner et al., 2007; Stevens et al., 2001; Stevens et al., 2014). One factor not explicitly built in the scenarios was the specific experiences and capabilities of each person, even though TUG and FR performance was measured after the risk judgements were made. So, Person-Environment fit was not explicitly accounted for, which has been shown by Iwarrsson et al., (2009) to be a weak, but significant predictor of falls. The objective measures of physical function did not predict fall-risk appraisal scores or balance confidence.

Balance confidence seems to be based on both things older adults do (caution) and single factors (i.e., a specific hazard identified as particularly risky). While one would expect when risk is appraised as high, balance confidence would then be low, the opposite for some older adults was found where in higher risk situations the older adult expressed high balance confidence. This suggests that risk appraisal and balance confidence are independent. This may be why a relationship was found where older adults modified and limited their physical activity (i.e., non-essential activities) because of their perceived fall-risk and their fear of negative consequences as a result (Lach, 2005; Lee et al., 2008; Painter et al., 2008; Zijlstra et al., 2007). This can be both problematic and strategic as environmental hazards or the older adults themselves may overlook their ability.

The older adults' responses as to why they were fearful, somewhat fearful and not fearful of falling demonstrated that fear of falling may not be a very useful concept as it gives reference to their judgements of risk on a general level. Judgements are situation specific rather than generalized across scenarios. Many older adults (n=14) in this study were found to execute care and increased caution even in a situation of risk. This is in line with Mahler

and Sarvimaki (2012) and Lee et al. (2008) where they emphasized a discipline of daily life of learning to live with the potential challenges of falling. Older adult's appraisal of fall-risk and balance confidence may be inaccurate in nature. This has lead to inappropriate relative and absolute risk judgements or in some cases appropriate decision-making that lead to increased caution when appraised fall-risk was high. The research findings in the present study suggested that both objective and subjective factors affect fall-risk appraisal. Physical ability (found through the TUG and FR test) was not a significant predictor of appraisal of fall-risk or the number of hazards present in the study. Thus, to improve older adult's appraisal of risk both research and clinicians need to consider that subjective appraisal of risk may have a greater influence on decision-making in scenarios of potential fall-risk.

Practical Application: Falls Prevention and Effective Living Strategies

As the Baby Boom population bulge continues to approach 65 years and older, it is a critical time now more than ever to apply what has been found in research into action such that health care providers are better equipped to provide supportive care than just objectively treating one problem at a time. Through clarifying the nature of older adults' fall risk appraisals, researchers and health care consumers can gain a better understanding of what influences older adult's decision-making and subsequent actions. Thus, from a practical perspective it would be informative to know the specific scenarios older adults may avoid and not avoid. Lachman et al. (1998) had suggested that older adults do not necessarily restrict their activities, rather, they make appraisals based on personal preference, external constraints, and their physical limitations. Fall-risk assessments should not assume that physical ability and fall hazards are predictive of individuals who fall. Specifically, assessment as well as fall prevention programs will benefit from the incorporation of

subjective components like improvement of risk judgement and increasing older adult's balance confidence. This could in turn be used to improve falls prevention strategies and effective living strategies in older adults.

The findings in the present study suggest that risk factor training may be an important safety practice for community-dwelling older adults, since older adults' accuracy of risk appraisal may be improved. When fall-risk is appraised accurately, older adults can perform activities that match their physical capabilities and the environmental situation at hand. As a result, increased confidence in activities of daily activities may occur which can prevent the commonly talked about negative vicious cycle of a fear of falling which could lead to a negative downward cycle of decline in health. Older adults were found to focus on one hazard at the expense of overlooking the other hazards in a situation that may be associated with greater risk, which has lead to inaccurate appraisals. This may be the result of the unpredictability of the hazard that is appraised. Thus, it is important for a risk factor training program to teach older adults effective living strategies to act appropriately when hazards (i.e., a dog) are unpredictable (or not).

Falls prevention programs will benefit from addressing safety education. For example, risk factor training may be an important safety practice for older adults, since older adult's accuracy of risk may be improved. The main goal will be to have older adults accurately appraise the situation presented to them to ensure they make appropriate actions whether it be through increased caution or altering the activity to fit their needs. This will improve falls prevention through addressing many risk factors for falls in older adults and consider the Person-Environment fit (Iwarrsson et al., 2009) to help older adults have an active role in their decision-making. As a result this will distinguish older adults' appraisals of risk from risk avoidance to inform risk-taking decisions in activities of daily living. While

older adults may reject fall prevention programs to avoid potential threat to their identity and autonomy (Yardley et al., 2006) and they may be more concerned with risk to personal and social identity rather than fall-risk itself (Ballinger and Payne, 2002) it may be useful to frame these programs in a manner that emphasizes balance confidence and addresses Person-Environment fit.

Another practical application from this study for fall prevention methods in older adults would be to improve self-efficacy to perform activities. Health promotion is a key endeavor in this case as the older adult requires balance confidence in activities of daily living in order to remain independent and have a high quality of life. Arnold and Faulkner (2009) suggested that balance confidence was the strongest predictor in balance performance measures. Thus, if older adults have an enhanced understanding and assertion through informed behaviour to accurately appraise fall-risk they can have a greater balance confidence in activities of daily living and not avoid activities as previous research has suggested. This can be done through significant others. These individuals can include family, friends, and health care providers. Through teaching effective strategies that help older adults manage risky scenarios and behaviours that could result in injury like a fall, this understanding can help facilitate feedback to the older adult, which may be needed when older adults are desensitized to their surroundings. As a result, better care and support can be provided to older adults to be enacted proactively rather than reactively. This will become necessary to decrease the potential financial burden the health care system may encounter if fall prevention and effective living strategies are not carried out and enhanced to better suit the aging population. For example, consider exercise and balance training to improve self-efficacy to increase confidence in performing activities of daily living.

Health is an important aspect in anyone's life. As we age, sometimes subjective and objective health can lead to an imbalance. Thus health care professionals should not solely focus on physical functioning, but also on older adult's appraisal of fall-risk and its the meaning to them in order to grasp the bigger picture of an older adult's health. As a result, a greater understanding of how fall-risk and older adults accuracy in risk judgement can help clinicians develop more individualized fall screening and prevention programs that help the older adult with appropriate risk judgement and the potential of decrease fall-risk in specific situations.

Limitations

There are limitations that may have affected the results of this study. First, the study utilized convenience and snowball sampling, which may have lead to biased results due to non-probability sampling. The study participants were recruited from the Canadian Centre for Activity and Aging and the London, Ontario, Canada community where older adults were found to participate in physical activity, which might explain the high TUG and FR scores. Also many of these participants (56%) were highly educated having partial university degrees, undergraduate degrees, and graduate degrees, which may have impacted their appraisal of fall-risk. As a result, many of these participants were higher functioning older adults who had a large degree of independence. This study utilized participants who were between the ages 65 years to 86 years old (M=74.93). As a result, the study did not obtain data from older adults 87 years and older. The use of a small sample size (n=30) resulted in the use of more descriptive analysis than inferential statistics. For these reasons, this mixed methods study is not generalizable to the older adult population. However, it does provide representative fall-risk appraisal of individuals who are similar to the demographic

information of relevant studies. However, appraisal of fall-risk is unique to the individual and should be looked upon in an individual basis rather than as a collective whole.

Furthermore, the four specific indoor scenarios that were used in this particular study ranked based on fall-risk hazards identified were the researcher's own creation verified by 15 other fall knowledgeable individuals. The scenarios have not been independently validated. Also, the older adults' appraisals of fall-risk were limited to the four indoor walking activities found in the scenario descriptions. Furthermore, the scenarios with fewer hazards had little variability in the number of hazards identified making the regression analyses problematic. Additionally, all measures were taken only once in a single interview session. Thus, the results may be affected by the state of the participant on that particular day. Repeated measures across different days would help account for variability in appraisal of fall-risk and functional ability. Moreover, another study limitation was that the majority of fall-risk hazards in the four scenarios were environmental and external to the older adult, thus not taking into account many internal hazards that could have affected the potential to fall.

Another study limitation was that interviews with older adults were not held in the same location. This could have affected older adult's appraisals of fall-risk. Also, the TUG scores may have been affected by the different heights of the chairs used and the different floor surfaces (i.e., carpeting versus linoleum flooring). Additionally, seasonality during the interview may be a limitation. The time of year (i.e., winter season) of the interview may have had an effect on appraisals of fall-risk (i.e., when explaining their fear of falling many participants commented on snow and ice being an factor for they fear of falling or low balance confidence). In future studies it may be useful to interview participants in different seasons (i.e., winter and spring/summer) to encompass the appraisal of fall-risk that can be situational due the present weather conditions.

Future Directions

Research has suggested that older adults can be overcautious and subsequently decrease activity to facilitative the prevention of falls (Delbaere et al., 2004; Lee et al., 2008; Rubenstein, 2006). Often, a misappraisal of health and capabilities can occur. Future research should attempt to examine how objective and subjective appraisal of risk affects older adult's behaviour through the use of different independent variables that predict appraisal of risk. By doing so, research can gain an increased understanding of how older adults can use risk appraisal to their benefit and continue to do activities of daily living with balance confidence. However, it is important to consider that individual factors (i.e., internal health) are only part of the equation. Future research should also study fall-risk appraisal and balance confidence within a sociocultural context to gain an enhanced understanding of older adult's decision-making process during day-to-day activities. As a result, older adult's personality affects on fall-risk may become better understood.

Future research is encouraged to further examine methods used to measure a fear of falling that can measure appraisal of fall-risk in the older adult population without limiting its comparative analysis with research literature. Moving forward, appraisal of fall-risk should be given increased consideration in older adult assessments and when designing future research involving community-dwelling older adults rather than fear of falling. Furthermore, while hypothetical scenarios may reflect actual risk-taking behaviour (Morrongiello and Matheise, 2004) future research should employ naturalistic observations to fully understand what contextual factors influence appraisal of fall-risk in older adults. Also, a consideration of multiple interviews with older adults across multiple times using repeated measures should be employed such that the results are not affected by a participant's momentary affective state.

Moving forward, it would be useful for future research to understand the gendered meaning of appraisal of fall-risk. The consideration of gender differences in older adult's appraisal of fall-risk will be important to understand their decision-making and behaviour. Many previous studies with older adults and fear of falling represented the female gender who were found to be more likely to express a fear of falling (Suzuki et al., 2002; Zijlstra et al., 2007). The underrepresentation of males and overrepresentation of females can be problematic leading to misinterpreted information about the aging population. Hillier and Morrongiello (1998) and Morrongiello and Matheise (2004) suggested that from a young age males and females attribute different risk for similar activities where males rate risk as lower than females. While the present study had an equal representation of both the male and female gender, the study's objective was not to understand gender differences in appraisal of fall-risk. Understanding older adult's perceived vulnerability and appraisal of fall-risk in activities of daily living could be used to understand and predict falls in older adults. As a result, future research may be used to help fall prevention planning to capture both genders appraisal of fall-risk related to environmental components that can affect risk of falling.

Conclusions

The findings in this study demonstrated that fall-risk appraisal and balance confidence judgements were specific to the situation rather than generalized across scenarios. Also, older adults may be inaccurately appraising risk since both absolute risk judgement and balance confidence were not predicted by physical ability or the identification of the number of hazards present in a scenario. As a result, they may be using individualized measures, tailoring their assessments to past experience and subjectively framed appraisals. The use of

qualitative data in support of the quantitative data collected contributed further understanding to older adult's decision-making that underlie their decision-making. The data presented a general pattern of careful behaviour and increased awareness in situations that may have fall-risk. This research was important for investigating appraisal of fall-risk, which can help clinicians develop fall screening and prevention programs as well as provide primary fall prevention strategies and effective living for community-dwelling older adults. Future research should examine the difference between males and females and investigate what the most important factor older adults use to appraise fall-risk since both physical ability and the number of identified hazards were not found to strongly predict absolute risk judgement and balance confidence as suggested from this study.

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Appendix A: Canadian Centre for Activity and Aging Approval to Recruit Participants

Canadian Centre for Activity and Aging
Approval to recruit CCAA, RRAA & LRRA program participants

Study Title: Fear of falling in community-dwelling older adults: Is risk appraisal accurate?	**Ethics Approval No.** 105684
Name of Principle Investigator: Dr. Alan Salmoni **Telepho** [redacted] **Email:**	
Names [redacted] **dinator/contract person)** Parinha Karen Simmavong* [redacted]	
Subject Characteristics: Number to be Recruited: Age Range: 65+ Gender: both males and females	**Recruitment Start Date:** Tues. Nov 18/14
Study Outline: The study takes about 30mins to administer with the following instruments and procedures: The Falls Risk Awareness Questionnaire, one's fear of falling will be assessed using the single item question, 'At the present time are you very fearful, somewhat fearful, or not fearful of falling?', absolute risk judgment (estimate of how much fall-risk is present in a specific situation using a visual Analogue Scale) and relative risk judgment (one's ability to determine which scenario presented two at a time is more risky than the other) of four fall related scenarios in random order, asked what their balance confidence is in each scenario that they will not lose their balance, and finally the Timed-up-and-go Test and the Functional Reach test.	
Signatures (Principle Investigator) [redacted]	**(CCAA Research Director)** **D.H. Paterson Ph.D.**
(CCAA Program Director) [redacted]	**(CCAA Medical Director)** [redacted]

Appendix B: Recruitment Advertisement

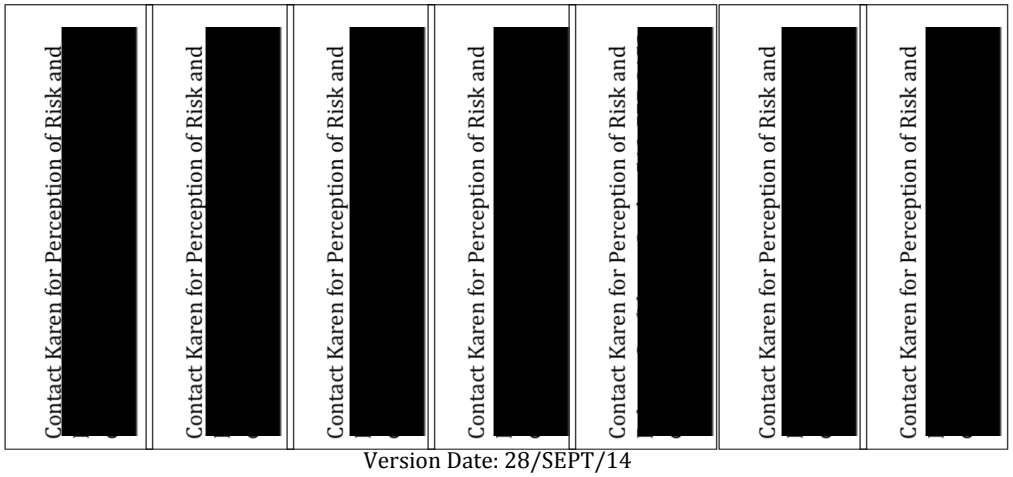
Western

Perception of Risk and Balance Confidence Research Study

Master's student, Karen Simmavong under the supervision of Dr. Alan Salmoni is conducting a study looking at how one's perception of risk and balance confidence impacts behaviour in older adults.

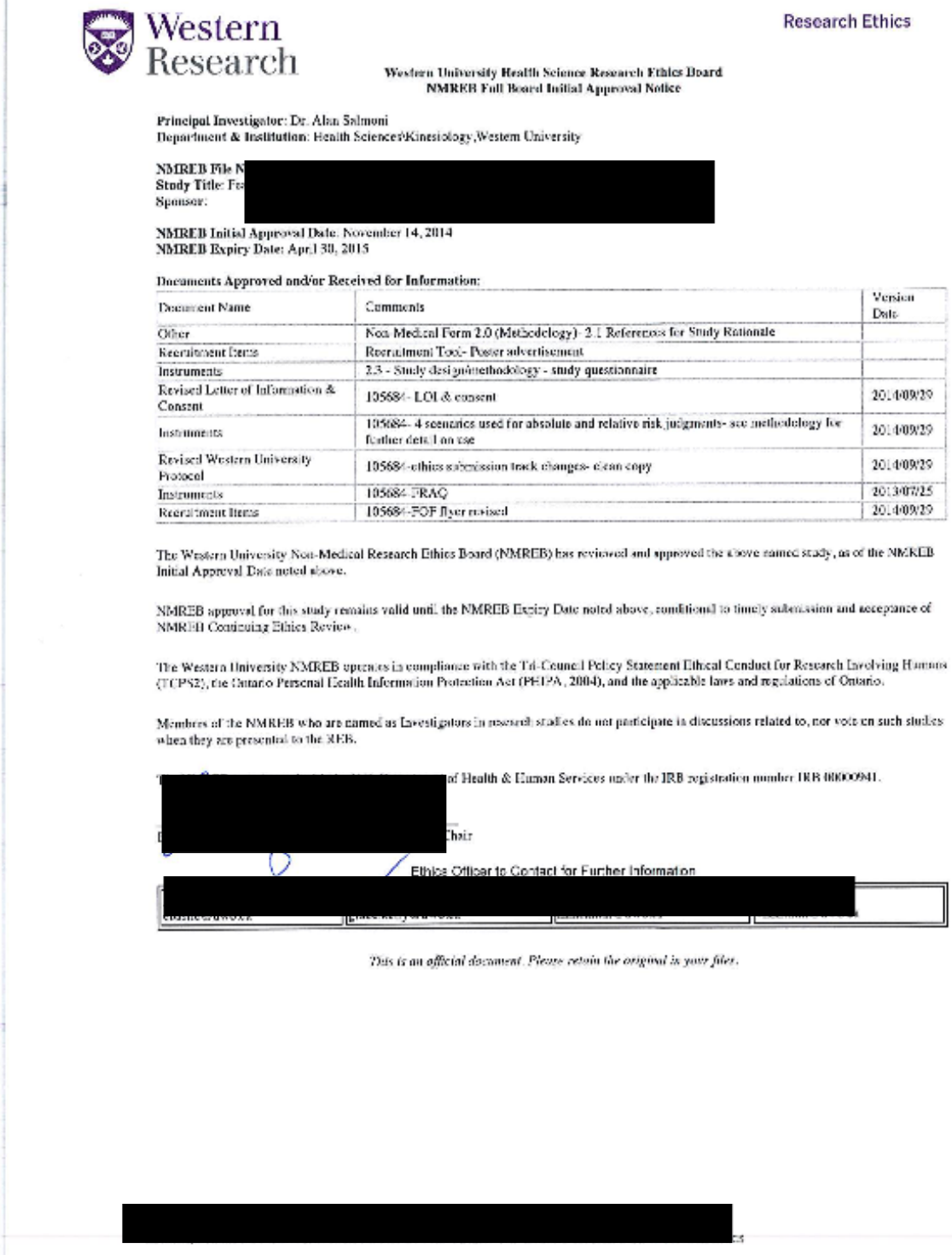
If you are a **male or female, 65 years of age or older,** and <u>one or more</u> of the following describes you: 1) **have or have not fallen**, 2) are **concerned or not concerned about falling**, 3) **able to walk 3 meters comfortable and stand for a few minutes unsupported** you are eligible to take part.

If you are interested in hearing more about the study, please **contact Karen [redacted].**



Version Date: 28/SEPT/14

Appendix C: Research Ethics Approval for Research Involving Human Subjects



Western Research

Research Ethics

Western University Health Science Research Ethics Board
NMREB Full Board Initial Approval Notice

Principal Investigator: Dr. Alan Salmoni
Department & Institution: Health Sciences\Kinesiology,Western University

NMREB File N[redacted]
Study Title: Fe
Sponsor:

NMREB Initial Approval Date: November 14, 2014
NMREB Expiry Date: April 30, 2015

Documents Approved and/or Received for Information:

Document Name	Comments	Version Date
Other	Non Medical Form 2.0 (Methodology) 2.1 References for Study Rationale	
Recruitment Items	Recruitment Tool- Poster advertisement	
Instruments	2.3 - Study design\methodology - study questionnaire	
Revised Letter of Information & Consent	105684 - LOI & consent	2014/09/29
Instruments	105684- 4 scenarios used for absolute and relative risk judgments- see methodology for further detail on use	2014/09/29
Revised Western University Protocol	105684-ethics submission track changes- clean copy	2014/09/29
Instruments	105684- DRAQ	2013/07/25
Recruitment Items	105684-POF flyer revised	2014/09/29

The Western University Non-Medical Research Ethics Board (NMREB) has reviewed and approved the above named study, as of the NMREB Initial Approval Date noted above.

NMREB approval for this study remains valid until the NMREB Expiry Date noted above, conditional to timely submission and acceptance of NMREB Continuing Ethics Review.

The Western University NMREB operates in compliance with the Tri-Council Policy Statement Ethical Conduct for Research Involving Humans (TCPS2), the Ontario Personal Health Information Protection Act (PHIPA, 2004), and the applicable laws and regulations of Ontario.

Members of the NMREB who are named as Investigators in research studies do not participate in discussions related to, nor vote on such studies when they are presented to the REB.

[redacted] of Health & Human Services under the IRB registration number IRB 00000941.

[redacted] Chair

Ethics Officer to Contact for Further Information [redacted]

This is an official document. Please retain the original in your files.

[redacted]

Appendix D: Letter of Information and Consent

Project Title: Fear of falling in community-dwelling older adults: Is risk appraisal accurate?
Principal Investigator:
Parinha Karen Simmavong, M.A. Candidate, B.A., Western University
Dr. Alan Salmoni, PhD, Western University

Letter of Information

1. **Invitation to Participate**

   You are invited to participate in a research study conducted by Parinha Karen Simmavong – M.A. student at Western University and Dr. Alan Salmoni – Professor at Western University investigating how one's perception of risk and balance confidence impacts behaviour in older adults. You are being asked to participate because you meet the eligibility requirements of being male or female; aged 65 years or older, have or have not fallen, are concerned or not concerned about falling, able to walk 3 meters comfortably (with or without aid) and stand for a few minutes unsupported.

2. **Purpose of the Letter**

   The purpose of this letter is to provide you with information required for you to make an informed decision regarding participating in the present research study.

3. **Purpose of this Study**

   The purpose of this study is to:
   - Develop an understanding of whether appraisal of risk is situation specific or general as literature portrays it
   - Investigate older adults' appraisal of risk of falling and whether their appraisal of risk is accurate or inaccurate according to one's self-efficacy and perception of potential risks where these factors may motivate one's subsequent behaviour

4. **Inclusion Criteria**

   Individuals that are both the female and male gender, older adults aged 65 years and older; those living independently in the community, those who have falling the past 12 month, and those who have not fallen are eligible to participate in this study.

5. **Exclusion Criteria**

Individuals who are not residing in London, Ontario will be excluded. Older adults with the inability to continue conversations in English will also be excluded as a potential participant. Older adults who are unable to walk three meters in order to complete the Timed-up and go test and unable to stand for a few unsupported will also be excluded as a potential participant in this study.

6. **Study Procedures**

If you agree to participate, you will be asked if you have a fear of falling, to complete a Timed-up-and go test (walk three meters at a comfortable pace, turn, and return to chair), a Functional Reach test (a measure of initial reach vs. forward reach), absolute risk judgement (i.e., estimate how much fall risk is present in a specific situation) and relative risk (i.e., one's ability to determine which of the scenarios presented is more risky than the other) judgement appraisals of fall-risk scenarios, complete a Falls Risk Awareness Questionnaire, and answer, "At the present time are you very fearful, somewhat fearful, or not fearful of falling (falling again)". It is anticipated the entire task will take 30 minutes over one session. The study will include a total of 30 participants.

7. **Possible Risks and Harms**

There are no known or anticipated risks or discomforts associated with participating in this study. Participants may feel negative emotions when asked to recall and describe their reasoning as to why they had a certain perception of risk in a particular situation. However, the participation in this study is voluntary and you may chose to withdraw from the study at any point in time.

8. **Possible Benefits**

There are no direct benefits to the study participants. Participants may become more aware of how they appraise risk in a given situation and in doing so have a more accurate assessment of risk than needless avoidance of activity in the future. Information gathered may provide benefits to society. Participants may benefit from feeling like they have contributed to the betterment of their community through the completion of the study. It is anticipated that participants may benefit indirectly due to the fact that results from the study may be used by future studies to inform the fear of falling literature in expanding the appraisal of risk through addressing the specificity of risk in particular situations, the appraisal of risk in different situations, and the potential of misappraisal in older age.

9. **Compensation**

There is no payment for participating in this research study.

10. **Voluntary Participation**

Participation in this study is voluntary. You may refuse to participate, refuse to answer any questions or withdraw from the study at any time without consequences of any kind (i.e., care etc).

11. **Confidentiality**

All data collected will remain confidential and accessible only to the investigators of this study. If the results are published, your name will not be used. If you choose to

withdraw from this study, your data will be removed and destroyed from our database. All questionnaires and letter of information will be kept locked in a cabinet of the office of the primary investigator. Data will be entered, analyzed, and stored on a password protected laptop of the investigator. Surveys will be kept for a minimum of five years and properly destroyed following the computer and data storage protocol.

12. Contacts for Further Information

If you have any questions about your rights as a research participant or the conduct of this [redacted] ntact The Office of Research Ethic[redacted]:
[redacted]

If you have any questions or concerns about the research you may contact Dr. Alan [redacted] or Karen Simmavong at [redacted]

13. Publication

If the results of the study are published, your name will not be used. If you would like to receive a copy of any potential study results, please contact Karen Simmavong at [redacted]

This letter is yours to keep for future reference.

Consent Form

Project Title: Fear of falling in community-dwelling older adults: Is risk appraisal accurate?
Study Investigator's Name: Parinha Karen Simmavong and Dr. Alan Salmoni
I have read the Letter of Information, have had the nature of the study explained to me and I agree to participate. All questions have been answered to my satisfaction.

Participant's Name (please print): _____

Participant's Signature: _____

Date: _____

Person Obtaining Informed Consent (please print): _____

Signature: _____

Date: _____

Appendix E: The Fall Risk Assessment Questionnaire

Fall Risk Assessment Questionnaire

Part I Falls Risk Survey

The following questions are about seniors and falls. We are interested in your opinion. There are no right or wrong answers.

1. Do you think seniors can change their activities to prevent falls?

   ☐ 1 Yes
   ☐ 2 No
   ☐ 3 I don't know

2. At this time, do you feel you are at risk for falling?

   ☐ 1 Yes
   ☐ 2 No
   ☐ 3 I don't know

3. Most falls result in (Choose one only)

   ☐ 1 Hitting head
   ☐ 2 Cuts and Bruises
   ☐ 3 Death
   ☐ 4 Broken hip
   ☐ 5 No effects
   ☐ 6 Stubbing toe
   ☐ 7 Unable to do regular activities
   ☐ 8 Other _____
   ☐ 9 I don't know

4. Falls will make an older persons less confident in moving around.

   ☐ 1 True
   ☐ 2 False
   ☐ 3 I don't know

5. Where are falls are most likely to occur?

- ☐ 1 At home
- ☐ 2 On the street
- ☐ 3 In a public building
- ☐ 4 Nursing home
- ☐ 5 On a farm
- ☐ 6 Other _____

6. Do you think older age increases a person's risk of falling?

- ☐ 1 Yes
- ☐ 2 No
- ☐ 3 I don't know
- ☐ 4 I would rather not answer this question

7. Do you feel that using a walker correctly may increase the chance of falling?

- ☐ 1 Yes
- ☐ 2 No
- ☐ 3 I don't know
- ☐ 4 I would rather not answer this question

8. Footwear is an important factor in falls. What type of footwear is the safest?

- ☐ 1 High heels
- ☐ 2 Knitted slippers
- ☐ 3 Loafers
- ☐ 4 Sandals
- ☐ 5 Lace up walking shoe
- ☐ 6 Hiking boots

9. Which of the following has the highest risk for falling?

- ☐ 1 Stepping in and out of a bathtub
- ☐ 2 Stepping on and off a sidewalk
- ☐ 3 Walking on a dry tile floor
- ☐ 4 Walking in the snow

10. Are you at a higher risk of falling if you live with a family?

- ☐ 1 Yes
- ☐ 2 No
- ☐ 3 I don't know
- ☐ 4 I would rather not answer this question

11. Which of the following conditions can increase falls? (Please check ALL that apply.)

- ☐ 1 Alzheimer disease or dementia
- ☐ 2 Stroke
- ☐ 3 Deafness or being hard of hearing
- ☐ 4 Ear problems (such as dizziness, vertigo, ear infections)
- ☐ 5 High blood pressure
- ☐ 6 Thyroid problems
- ☐ 7 Diabetes

12. Do you think the risk of falling is increased by drinking alcohol?

- ☐ 1 Yes
- ☐ 2 No
- ☐ 3 I don't know
- ☐ 4 I would rather not answer this question

13. Which of the following medications, when used as prescribed, do you feel are likely to increase a senior's chance of falling? (Please check ALL that apply)

- ☐ 1 Insulin
- ☐ 2 Medicines that treat anxiety (worrying or stress) e.g. Ativan® or Xanax®
- ☐ 3 Medicines to help with sleeping e.g. Imovane® or Restoril®
- ☐ 4 Water pills (diuretics) e.g. Lasix® or Hydrodiuril®
- ☐ 5 Medicines that help your mood e.g. Celexa® or Paxil®
- ☐ 6 Tranquilizers such as "nerve pills" that control symptoms like hallucinations e.g. Risperdal® or Zyprexa®
- ☐ 7 Penicillin or other antibiotics e.g. Penicillin or Biaxin®
- ☐ 8 Medicines to lower blood pressure e.g. Lopressor® or Vasotec®
- ☐ 9 Low dose or once-a-day Aspirin®
- ☐ 10 Medicines for pain or inflammation e.g. Advil® or Celebrex®
- ☐ 11 Non-drowsy medicine for allergies e.g. Claritin® or Reactine®
- ☐ 12 Pain medicines like codeine or morphine
- ☐ 13 Medicines for the heart e.g. Digoxin
- ☐ 14 Medicine to prevent heartburn e.g. Losec® or Prevacid®
- ☐ 15 Medicine for asthma e.g. Ventolin® or Flovent®

14. Do you think a senior who takes several medicines has a greater chance of falling than a senior who takes one medicine?

- ☐ 1 Yes
- ☐ 2 No
- ☐ 3 I don't know
- ☐ 4 I would rather not answer this question

15. What effect do you think staying physically active will have on falls?

- ☐ 1 increases your chances of falls
- ☐ 2 has no effect on your chances of falls
- ☐ 3 reduces your chances of falls

16. Do you think getting up during the night to go to the bathroom leads to falls?

- ☐ 1 Yes
- ☐ 2 No
- ☐ 3 I don't know
- ☐ 4 I would rather not answer this question

17. When getting out of bed, it is best to:

- ☐ 1 get up immediately
- ☐ 2 sit on the edge of the bed for a minute
- ☐ 3 makes no difference how to get out of bed

18. Do you think eating salty potato chips can cause falls?

- ☐ 1 Yes
- ☐ 2 No
- ☐ 3 I don't know
- ☐ 4 I would rather not answer this question

19. Who do you feel is more likely to fall?

- ☐ 1 Men 65 years or older
- ☐ 2 Women 65 years or older
- ☐ 3 Equal likelihood of falling for men and women
- ☐ 4 I don't know
- ☐ 5 I would rather not answer this question

20. Are you more likely to injure yourself when you have weak or brittle bones?

- ☐ 1 Yes
- ☐ 2 No
- ☐ 3 I don't know
- ☐ 4 I would rather not answer this question

21. Do you think an older person is more likely to fall if they are fearful about falling?

- ☐ 1 Yes
- ☐ 2 No
- ☐ 3 I don't know
- ☐ 4 I would rather not answer this question

22. Does having an active little dog in the house have an effect on falls?

- ☐ 1 Yes, it increases the risk
- ☐ 2 No
- ☐ 3 I don't know
- ☐ 4 I would rather not answer this question

Falls Risk Assessment Questionnaire

Part II Demographic Information

The following questions ask for some personal information. This information will help us in our research about falls. All personal information will be kept confidential.

1. What is your year of birth? Year_____

2. What is your sex? ☐ 0 Female ☐ 1 Male

3. How many people live with you?

   ☐ 1 Live alone
   ☐ 2 One other person
   ☐ 3 Two or more other people

4. Where do you live?

   ☐ 1 House
   ☐ 2 Apartment or condominium
   ☐ 3 Assisted living
   ☐ 4 Lodge
   ☐ 5 Other _____

5. In general, how would you rate your health?

   ☐ 1 Excellent
   ☐ 2 Very good
   ☐ 3 Good
   ☐ 4 Fair
   ☐ 5 Poor

6. Have you slipped, tripped or fallen in the past?

☐ 1 Yes ☐ 2 No ☐ 3 Do not know

a. If yes, how recently?

☐ 1 In the past month
☐ 2 In the past six months
☐ 3 In the past year
☐ 4 More than 1 year ago

b. If you have fallen in the past year, how many times have you fallen?

_____

7. Have you ever been involved in a research study about falls?

☐ 1 Yes ☐ 2 No

a. If yes, please list or describe the study _____

8. What is the highest level of education you have completed? (Mark ONE only)

☐ 1 No Schooling
☐ 2 Elementary grade_____
☐ 3 Junior High grade_____
☐ 4 High School grade_____
☐ 5 Non-University Degree (Vocational, Technical, Nursing)

University
☐ 6 partial degree
☐ 7 undergraduate degree
☐ 8 graduate degree

9. On an average day, how far can you walk, with or without a cane or walker?

a. Distance Walked:

- ☐ 0 more than 10 blocks
- ☐ 1 6 – 10 blocks
- ☐ 2 1 – 5 blocks
- ☐ 3 Less than 1 block
- ☐ 4 indoors only
- ☐ 5 unable to walk

b. What support do you use to walk this distance?

- ☐ 6 None
- ☐ 7 One cane
- ☐ 8 One crutch
- ☐ 9 Two canes
- ☐ 10 Two crutches
- ☐ 11 Walker
- ☐ 12 Wheelchair

10. Now, we would like to ask you about any long-term health conditions you may have that have been diagnosed by a health professional. "Long-term" refers to conditions that have lasted, or are expected to last, 6 months or more.

Do you have any of the following long-term conditions that have been diagnosed by a health professional? *(Mark an "X" in the appropriate box beside each question)*

	Yes	No	Don't Know
Arthritis or rheumatism	☐	☐	☐
Osteoporosis (brittle bones)	☐	☐	☐
High blood pressure	☐	☐	☐
Heart disease	☐	☐	☐
Cancer	☐	☐	☐
Diabetes	☐	☐	☐
Epilepsy (seizures)	☐	☐	☐
Effects of stroke	☐	☐	☐
Difficulty controlling bladder	☐	☐	☐
Difficulty controlling bowels	☐	☐	☐
Difficulty hearing	☐	☐	☐
Cataracts	☐	☐	☐
Glaucoma	☐	☐	☐
Alzheimer's Disease	☐	☐	☐
Other	☐	☐	☐

Please list other conditions

_____

_____

_____

_____

_____

11. In the past MONTH, did you take any of the following medications? (Check ALL that apply)

- ☐ 1 Sleeping pills (e.g. Restoril® or Imovane®)
- ☐ 2 Medicine for worrying or anxiety (e.g. Ativan® or Xanax®)
- ☐ 3 Medicine to pick you up if you feel down or to improve your mood (e.g. Paxil® or Celexa®)
- ☐ 4 Tranquilizers such as "nerve pills" that control symptoms like hallucinations (e.g. Risperdal® or Zyprexa®)
- ☐ 5 Diuretics or water pills (e.g. Lasix® or Hydrodiuril®)
- ☐ 6 Medicine for blood pressure such (e.g. Vasotec® or Lopressor®)
- ☐ 7 Medicine for the heart (e.g. digoxin or nitroglycerin)
- ☐ 8 Medicine for pain or inflammation such as Advil® or Celebrex®
- ☐ 9 Pain medications such as Tylenol #3®, codeine or morphine
- ☐ 10 I do not take any medicines
- ☐ 11 Other medicines

Please list other medications (prescription medicine, non-prescription medicine and herbal or natural medicines)

_____
_____
_____
_____
_____

End of Survey Questions

Thank you very much for you time and effort!

Cheryl Sadowski
July 25, 2013

Falls Risk Assessment Questionnaire

Part III Debriefing (to be completed by the interviewer or completed and mailed in by respondent)

Do you have any comments about the questions, if they were easy to understand? Was there anything that was not clear?

Appendix F: Four Fall-risk Scenarios

Scenario A: While wearing your favourite old slippers you walk from the kitchen to the living room holding a glass of water. You are in a hurry to sit down and to turn on your TV so you can watch your favourite show. The chair is located across the room. You have to walk across the rug and around the coffee table to get to the chair. While walking, you notice your dog is lying on the floor directly in your path to the chair.

Scenario B: You have finished taking a hot shower. You have to step over the bathtub ledge to get out of the tub that has no grab bars. There is some water on the floor outside of the tub because the shower curtain was not properly closed during your shower. You have to walk across the ceramic tile and a loose bath mat to dry off before you change into your clothes that were left on the floor and put your glasses back on.

Scenario C: It is 10:00 pm at night and you are in your home. You have been having trouble sleeping the past few nights, so fifteen minutes ago you had taken a sleeping pill to help you sleep tonight. You decide it is time to go to bed. You turn off all the downstairs lights before going upstairs to your bedroom. To go upstairs you have to walk up the carpeted staircase before you reach your bedroom.

Scenario D: You are in your bedroom asleep in your bed. It is 2:00 am when you wake up in the middle of the night because you need to go to the bathroom. You get out of the bed slowly and get up onto your feet to walk towards the washroom. You do not turn on the lights because you feel comfortable with your surrounding and you also do not turn on the lights so you can go back to sleep more easily afterwards.

Appendix G: Fall Hazards for Each Scenario Identified and Described

Scenario (# of hazards identified)	Hazard	Description
A (6)	Old slippers	Environmental risk factor; modifiable
	Holding a glass of water	Environmental risk factor; modifiable
	In a hurry	Sensory and neuromuscular / Environmental risk factor; modifiable
	Coffee Table	Environmental risk factor; modifiable
	Rug	Environmental risk factor; modifiable
	Dog	Environmental risk factor; modifiable
B (8)	Hot shower	Sensory and Neuromuscular / Environmental risk factor; modifiable
	Bathtub ledge	Environmental risk factor; modifiable
	No grab bars	Environmental risk factor; modifiable
	Water on the ground	Environmental risk factor; modifiable
	Ceramic tile	Environmental risk factor; modifiable
	Loose bath mat	Environmental risk factor; modifiable
	No glasses on	Environmental risk factor; modifiable
	Clothes on the floor	Environmental risk factor; modifiable
C (4)	Sleeping pill	Medication risk factor; modifiable
	No lights on	Environmental risk factor; modifiable
	Staircase	Environmental risk factor; modifiable
	Tired (10:00pm)	Sensory and Neuromuscular risk factor; modifiable
D (2)	Tired (3:00am)	Sensory and Neuromuscular factor; modifiable
	No lights on	Environmental risk factor; modifiable

Appendix H: Latin Squares Used for Relative and Absolute Risk Judgements

Relative Risk Judgement Latin Square						
Participant	1	2	3	4	5	6
1	BD	AC	DC	AB	BC	AD
2	CA	DB	AB	CD	AD	BC
3	AD	BA	CD	CB	CA	BD
4	CD	AB	AC	BC	BD	DA
5	CB	AD	DC	BC	AC	BA
6	AD	CD	CA	BA	DC	CB
7	CB	DA	AB	AC	BD	DC
8	AD	BC	BD	CD	AB	CA
9	BA	CD	AC	DB	CB	AD
10	AB	AC	BD	BC	DA	CD
11	CD	AB	BC	DA	DB	AC
12	DC	CA	AB	AD	BD	CB
13	BD	AC	DC	AB	BC	AD
14	AC	DB	CB	DA	AB	DC
15	AD	BD	CA	BA	DC	CB
16	CD	BA	DA	BD	CB	CA
17	AB	DB	CA	AC	DA	DC
18	DB	AC	BA	DA	CB	CD
19	DA	BD	AC	AB	CD	BC
20	CA	BC	BD	AD	CD	AB
21	AD	CA	DC	BA	BD	CB
22	BA	DC	AD	BC	AC	BD
23	DB	CA	BC	AD	BA	CD
24	DC	BC	BD	AC	AD	AB
25	AC	DB	CB	DA	AB	DC
26	BC	AD	DB	CD	CA	BA
27	BD	CA	AD	CB	BA	CD
28	BA	DC	BC	CA	BD	DA
29	AC	BD	CB	BA	AD	DC
30	BD	AC	CD	DA	AB	BC

Absolute Risk Judgement Latin Square				
Participant	1	2	3	4
1	A	C	B	D
2	D	B	C	A
3	B	A	D	C
4	C	D	A	B
5	A	D	B	C
6	C	B	A	D
7	B	C	D	A
8	D	A	C	B
9	D	C	B	A
10	C	D	A	B
11	A	B	D	C
12	B	A	C	D
13	A	B	D	C
14	C	D	B	A
15	D	A	C	B
16	B	C	A	D
17	B	C	D	A
18	D	B	A	C
19	A	D	C	B
20	C	A	B	D
21	C	D	B	A
22	B	C	A	D
23	A	B	D	C
24	D	A	C	B
25	A	D	C	B
26	C	B	D	A
27	D	A	B	C
28	B	C	A	D
29	D	A	C	B
30	C	B	A	D

Appendix I: Visual Analogue Scale

Using the Visual Analogue Scales below, please indicate (with a line vertically) the fall related fall-risk you percieve present in each scenario shown:

A)

B)

C)

D)

Appendix J: Balance Confidence Scale

How confident are you that you will NOT lose your balance or become unsteady in each scenario?

Please circle your level of self-confidence by choosing a corresponding number from the following scales for each scenario:

A) 0% 10 20 30 40 50 60 70 80 90 100%
no confidence completely confident

B) 0% 10 20 30 40 50 60 70 80 90 100%
no confidence completely confident

C) 0% 10 20 30 40 50 60 70 80 90 100%
no confidence completely confident

D) 0% 10 20 30 40 50 60 70 80 90 100%
no confidence completely confident

Appendix K: Participants' Balance Confidence Responses

Why have you indicated your balance confidence the way you have for the scenarios?

Participant	Description
1	"You know what the problems are so I am extremely careful. If I wasn't confident I'd get [wife] to take my arm, but these scenarios I feel confident in." "If not confident, I'd hold onto something then I'd be confident."
2	"A-I am confident because its something I often do, except for the dog- I wouldn't expect it." "B-Issue for me is the loose bath mat, but mines never loose." "C-I am quite confident since its something I do all the time. The only issue is the sleeping pill." "D-Regularity of it. If the dog was there then I would be less confident. This is exactly what I do."
3	"I just don't have a problem walking. I don't have a problem and I am not afraid. I'm not infirm- I don't have problems, all there. Nothing stops me from getting up and going."
4	"Aware of the situation, but I know the possibility."
5	"I am more aware of the risk in the situation. I have slipped before in the washroom. I am more confident I won't fall or lose my balance because a I am more proactive in what I am doing."
6	"Because of all the possibilities that could happen. I am more confident is some because I do them regularly like the going to the washroom without turning the light on."
7	"I am more confident in those situations."
8	"All the things impeding where you want to go. With age there is always risk." "B-The tub can be difficult."

"D-The stairs I am confident."
"C-In the washroom, I have a night light."

9

"A-I have never had a dog."
"B-The water on the floor is a normal accident."
"C- There's no problem with no light on."
"D-I'm ok with D."

10

"A-I wouldn't be confident because of all the things. I don't like that."
"B-No confidence at all here what so ever."
"C- I feel pretty safe here."
"D- I am pretty confident about this one."
"I am relating myself to the scenarios. Some I feel more confident in, others I don't."

11

"The reason is because I don't feel terribly concerned. The conditions of falling are more severe in the first two than the second two."

12

"B-Well the slippery surface is very hazardous because you have no control. You could hit yourself on things."
"C-The stairs are high risk if you fall. There's a high risk of serious injury. Its unnecessary with no lights on."
"D-I feel in control of the environment."
"A-I think I can handle it. Not the same degree of comfort as D and C when I was familiar with the environment."

13

"A-I realize the dog is there and I think I wouldn't fall. I am aware."
"B-Stepping over a bath ledge I have caught my foot before. The water on the floor and the ceramic tile make it more slippery."
"C-I don't know why I would take a sleeping pill before going to bed, but a pill would make me less mentally acute."
"D-I 100% would turn the light on."

14

"Too many thing."
"C-doesn't vary- the things that are wrong."
"D- the lights are a big problem for me, not fully awake."

15

"D-I always turn on the light."
"B- there's no confidence. Bathtubs are a common theme of problem for me."
"A- getting around the coffee table is a easy task IF I focus."

"C- here you are asking for trouble. Need to make sure see step and focus."

16

"I take everything into effect. I take everything I do into account."

17

"I don't have any problems with balance. B is something you can't control. The others I can control."

18

"D-I am familiar with the surroundings. I do this every night."
"C-the lights are out. I tripped up the one time up the stairs."
"B-bath tub- getting up is always risky."
"A-I do that often to watch Jeopardy with coffee. The lights are one I have no problem with that."

19

"I think it's a risk analysis. I don't fall in the house, but there are times I lose balance. If I were in this situation with the experience I have. The experience of the moment we've been there. You perceive the risk and we're more careful."
"B-you see the risk so you're more careful."
"Anything can deal with and haven't loss balance. I am more confident versus lower or less.
"Ability to perceive potential problem and your experience in the past. It's a risk assessment of your own life."
"Back to the ladder idea. When I was 40 I could go up easily, but now I come down more carefully and get up two feet on the rung than one at a time."
"It's about realizing your own limitations and your past experience."

20

"Gut feeling."

21

"I just feel I can do all of these things except for the carpeted stairs. Oh an also the ceramic floor when wet and slippery. Other than that I feel very safe moving around."

22

"A-familiarity with the room."
"B-Too many risks of something happening."
"C-I am confident and know the place."
"D-Again, it's the familiarity with the location."

23

"A- Doesn't vary too much- the lights are one, its not wet or anything. You're use to a cat or dog being there."
"B- I'm aware of the danger and if I don't think about it I could slip."
"C- familiar place even if its dark its pretty much ok if you've taken preventative measures by not having things on the steps."
"D- You're familiar with the surroundings but you could be drowsy."

24

"A-Right now at my age I could react to anything that could come up."
"B- 50% confidence because when you take a step outside that shower you may not notice the water. You don't see it there like A. I'm less confident in this one."
"C-confident going up the stairs as long as going slowly."
"D- familiar with surroundings if nothing is on the floor. If I weren't aware then that would be different."

25

"A-If I was wearing loose slippers I would be conscious of holding a glass knowing it could slurp all over the place. I would be reasonably confident circumventing the coffee table and the rug. I would stay clear of the dog. I am reasonably confident and I would take caution."
"B-I would not have confidence."
"C-The fact that I have taken a sleeping pill, and turning off the lights I would not be confident in negotiation the steps."
"D-I do this if I have to get up at night and go to the washroom. I'm pretty confident. I deliberately put my clothes out on the chair at night and no shoes out on the floor."
"No matter how well you plan, things can happen. I would never put 100% confidence."

26

"A- Only because of the dog and you are rushing to the T.V."
"B-is more dangerous because of many reasons- the water on the floor and no grab bars is the main concerns."
"C-40% because of the sleeping pill will have taken effect after 15 minutes. It's too bad the lights are at the top of the stairs."
"D-90% because I do it 2-3 times a night and I'm pretty confident as long as I stick to my routine."

27

"A-that's below average because I'm in a hurry, the dog is there and a coffee table is in the way."
"B-All kinds of risk in that one."
"C-I don't like the sleeping pill and there's no light."
"D-I do this a lot and often do this and am confident. I have a night light in the washroom."

28

"D- I do this all the time. I'm pretty confident I won't fall. Mind you sometimes I do get dizzy when I get up too fast."
"A-70%- because usually when this is happening the lights are one. There is no issue here."
"B- In my bathroom we don't have a big ledge, but you do have to be aware of it. The linoleum floor could be slippery. When I don't have my glasses on I can't see the conditions and I have less confidence and take my time. I place my towel nearby on the counter- I'm a habitual person and I do things methodologically, but sometimes I can forget things."
"C-going up the stairs I count them. I know there are 14 steps on my stairs. The lights are also on at the top and I count the stairs. I am confident, but I do worry when the lights are off. I am careful to plant my foot. When I am tired I have been prone to slip so I'm careful. Generally I don't worry. Like yesterday I chopped a tree down and I was sloshing around everywhere, but I think physical activity helps. Hopefully that's good for me.

29

"A- not 100% because in a hurry and wearing slippers. There's a hazard there. The dog may or may not be a factor."
"B- not wearing glasses can be dangerous because you may not adequately respond. Water on the tile floor is dangerous. Blood pressure and hot shower may be light headed."
"C-night time and the sleeping pill are the biggest factors. You can trip just as much going up as going down the stairs- trip going up the stairs than down is easier."
"D-dark and can't see. You might trip and fall."

30

"I just don't worry about it and I have been doing all these things for years."

Appendix L: Participants' Responses to the Fear of Falling Question

'At the present time are you very fearful, somewhat fearful or not fearful of falling (falling again)?'

Participant	Very fearful	Somewhat fearful	Not fearful	Description
1	X			-"My balance is not good, especially outside. Inside is good because there is always something I can reach" -"I am very careful and use my cane."
2			X	- "I don't feel that vulnerable. I am cautious in situations of falling and try and prevent it." - "I am in good shape" -"Despite what [my husband] might say I'm not afraid (he says she rushes)"
3			X	-"Falling doesn't happen to me, not anymore than I would" -"It's not a concern to me- I feel sturdy on my feet, I don't feel my age has made me scared anymore than an ordinary person"
4			X	-"I am just not fearful at all of falling"
5		X		"One, I am 82. Two, I've had a knee replacement and I have physical limitations. Three, I am not as young as I use to be." "Also I know what can result from falling, including death."
6		X		"Because I don't want to break anything."

7		X	"There's no fear- fear means something I'm worried about and I'm not"
8		X	"When walking I don't feel like I'm going to fall. "I always hang onto the banister" "If I need to be steady I put my hand out and grab something. I don't like it when you're going to fall."
9	X		"I did have a fall recently, but it was when I was sick and had an accidental fall." "I am fearful, but not fearful- was a freak accident."
10	X		"That's why I take care- I wear certain shoes and am mindful of ice and snow." "I am quite aware of it and I watch for that."
11		X	"I have good balance."
12		X	"I am not fearful, but careful." "Trying to be aware of the situation" "When I was younger I could do things- I am less confident of balance on one leg now and have a diminished sense of balance." "When you are aware of your limitations you are more concerned with the potential of losing balance." "Always have something within reach."
13		X	"I think I have pretty good balance." "Maybe I should be fearful, but I'm not."
14		X	"Unless I am upstairs and coming down I

			am not fearful."
			"Not worried about it, but it's there."
			"I'm cautious."
15			
	X		"Balance is my problem. I do exercise in class and at home to help my balance. Like the one where you stand with one foot in front of the other. That's a good one."
16		X	
			"I'm steady, I can walk steady."
			"I'm just not afraid of falling."
17		X	
			"I did fall once in February. There was fresh snow on the ground with ice and I was in the dark. I broke a rib."
			"I am confident in not falling."
18		X	"Because I play tennis 2x a week and I go to a yoga class once a week."
			"I try to take my time going down the stairs and slow down. One of my closest friends fell down the stairs and landed with her foot through the wall. It took her a whole year to recover."
19			
	X		"Its always in the back of my mind, especially if there's an issue."
			"There's risk assessment to be considered. In normal activity I don't think about it much since risk is low, but when I have to get up on a ladder and clean the eaves trough I have some hesitation."
			"It really depends on what needs to be done. Like the eaves through or going on a ladder."

20	X		"I'm somewhere between somewhat and not fearful of falling because I have taken two falls in the last 5 years. One where I did not lift my foot on a curb and another time on campus. It's a good reminder of lifting your foot."
21		X	"Well I mean I just don't think I'm going to fall. I watch what I do." "If you worry about it, you're going to fall."
22	X		"Because of my bones and the osteoporosis."
23	X		"Because of the ice outside. Also I feel my balance is not as good as it use to be."
24		X	"Because I'm just not fearful. I watch where I walk. I'm in pretty good shape. I'm just not very fearful of falling."
25	X		"I don't like the word fearful. I'm aware of it and I don't want it to happen, so I'm somewhat fearful." "Anything can happen at anytime."
26		X	"I'm not fearful, but I'm very cautious because I have fallen before. I broke my collar bone a couple of years ago outside during winter."
27		X	"I'm no fearful, but I'm aware. Especially in the winter I take very short steps which means there's some awareness."
28		X	"Because I'm a runner and walker. I also do cross country skiing. I am not fearful of

				falling."
29			X	"I'm an avid hiker. I also do curing twice a week. I am fairly active and am not fearful of falling. I've fallen once this year while I was hiking. Maybe I should be, but I'm not."
30		X		"I don't know, just up and down the stairs I'm careful- stairs with glasses can be difficult because only certain part of the glasses are clearer. Also it's a catch 22 – you want to walk outside during the winter but you're afraid of slipping on ice under the snow so you stay inside more."
Totals	1	11	18	

Appendix M: Participants' Responses for Incorrect Relative Risk Judgements

Scenarios	Scenario appraised with greater risk	Description	Total
AB/BA	A	A- all the hazards, although you could easily correct those hazards though like slow down, clearer path, put the dog somewhere else A- dog in the way A- holding onto a glass of water- you could slip somewhere and fall A- there are more obstacles in the way Both not good; A- dog is riskier, there's more things and you are holding a drink like a coffee A- most dangerous specifically the dog there B- I'm very careful when getting in and out of the tub. I've never had a problem with it and I'm very careful in the bathroom so A is riskier	7
AC/CA	C	C- the stairs and its dark C- same as above (C/D- C- I do not like going up and down the stairs with no lights on- I think its risky compared to D) but I am aware and can handle the situation; A- I would be careful, assuming you can see and feel comfortable C- because its upstairs, you've also taken your pill which ok but should have taken when upstairs; A- the biggest things is the dog in the way C- I can see this as a problem if I shut off the lights C- I have tripped going up the stairs up at night C- taking meds and fatigue; A- there's lighting, although you can never trust dogs C- again problem number one is the surface, worse to have carpeted stair case- have a rise and could fall C- medication that's going to make you drowzy, no light and a carpeted staircase C- because its dark; A- you can see what you are doing C- because its dark and you can't see- more hazardous then seeing the dog, there could be something on the stairs that you can't anticipate, carpeting can trip	10
DC/CD	D/ NEITHER	D- no matter what you are groggy getting up in the middle of the night; C- these things might not	10

		be a problem D- most of these things I do. I also have two dogs in bed with me Neither- you are so use to your surroundings D-operating with out lights even when you're comfortable with your surroundings- complete darkness is more risky; you don't always remember things- when the lights are off you are more prone to make mistakes D- I do this every night; I chose D just because there are no lights on D- you know where you are going though D- exactly what I do- I don't turn the lights on D- you don't have any lights on so its possible you can fall and you're groggy; C- don't know how long it takes for a pill to take effect D- body not ready to go when you get out of a sleep- you're wobbly- could be a problem; C- there's a sleeping pill that could be a problem D- a lot of things could happen here; C- just have to go upstairs and that's routine	
BC/CB	C	C- to me up the stairs with not light is a higher risk. These situations might even be equal. There's a danger of falling a distance with gravity and for serious injury C- because sleeping pill- they're addictive too C- same things as before- sleeping pill maybe a problem, but I never take that	3
AD/DA	D	D- getting up in the dark D- happens to me ever night; I keep the light on in the bathroom because I take sleeping pills D- dark at night and I'd be more likely to fall; A- its always early and light out- Jeopardy on right after supper D- well you're probably asleep and its dark but you get out of bed slowly A- you can see what you are doing, dog is there but can see that- you can navigate around; D- dark and you are sleepy and it's the middle of the night is the biggest problem D- dark and don't turn on the lights; A- I can see the dog so I can make allocations for that	6
BD/DB	D	D- you are more likely to walk down the stairs. I have worn slippers and I almost fell.	1

Appendix N: Curriculum Vitae

Curriculum Vitae

Name:	Parinha Karen Simmavong
Post-secondary Education and Degrees:	Western University London, Ontario, Canada 2013-2015 M.A. Western University London, Ontario, Canada 2009-2013 B.A.
Honors and Awards:	Western Graduate Research Scholarship 2013-2015 Faculty of Health Sciences Graduate Travel Award 2014 Travel Grant for the 43rd Annual Canadian Association on Gerontology Conference 2014 Barbara Brown Commemorative Scholarship 2014 Study Abroad Support Fund 2013 Faculty of Health Sciences Dean's Honor List 2013
Related Work Experience:	Teaching Assistant Western University 2013-2015
Conferences and Presentations:	Simmavong, P. K. (2014, October). *Fear of falling in community-dwelling older adults: Friend or foe?* Poster presented at the 43rd Annual Scientific and Educational Meeting Canadian Association on Gerontology, Niagara Fall, Ontario, Canada.