PERCEPTION OF FALLS AND CONFIDENCE IN SELF-MANAGEMENT OF FALLS AMONG OLDER ADULTS

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Mobility safety, especially fall prevention, plays a significant role in successful aging for older adults. Fall preventive programs aim to reduce risks for mortality from fall-related injuries among older adults. However, the covariation between personal perceptions of falls and factors and confidence of self-management in falls (CSMoF) is still under-studied despite its importance to fall prevention. Using the International Classification of Functioning, Disability, and Health (ICF) model, this dissertation aimed to investigate the relative contribution of CSMoF in relation to fall risk self-perceptions while controlling for demographics and self-reported health and functioning. Participants were 691 older adults recruited from Area Agency on Aging at Arlington, Texas. They completed measures of physical functioning, CSMoF, fall risk perceptions and fear of falls. Regression analyses indicated that fear of falls was the most predictive factor of CSMoF among older persons. Physical function measures of age, chronic illnesses of metabolism, sensory impairment, and health status were also significant predictors of the CSMoF. The interaction of perception of falls and fall experience attenuated CSMoF, with physical functioning limitations. Fear of falls served as a mediator through which demographic predictors influence CSMoF. The joint effects of perception of falls and fear of falls likely explain CSMoF among older adults more than physical functional indicators. Fall prevention programs for older adults should prioritize to address modifiable subjective factors of fall perceptions, fear of falls, and CSMoF across health and functioning statuses. Fear of falls should be the center of CSMoF enhancement.

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CHAPTER 1

INTRODUCTION

The United States of America (USA) is stepping into an aging epoch and the proportion of the older population is projected to reach 22% in 2020, representing about 87 million older adults (Ortman, Velkoff, & Hogan, 2015). While this population keeps enlarging, a better understanding regarding aging processes, physical and psychological health, and social interactions between current and future societies is lacking, and an urgent research need. The need is compellingly urgent as many older adults are at high (24%) risk for mortality from falls that occur mostly in the home (Alamgir, Muazzam, & Nasrullah, 2012) or in the neighborhood (Berdot et al., 2009). For this reason, fall prevention programs are on the increase to help support the physical strength of the elderly, reducing their risk for morality from fall injuries (De Mettelinge, Cambier, Calders, Van Den Noortgate, & Delbaere, 2013), and for managing their cognitive impairment, and chronic conditions (Tinetti & Kumar, 2010). Yet, the practical value of fall prevention programs rests, in part, on the individual older adults' perception of falls, which in turn, is influenced by their history of falls (Rao, 2005) and self-confidence in managing falls (Bae & Cho, 2014; Kim, 2013). This is not to underplay the importance of the physical lived environment in mitigating risks for fall injury and mortality. Studies are needed on biopsychosocial factors in fall prevention that address vulnerabilities and assets at the biologic/structural, activity, participation, environment and personal factor levels.

The World Health Organization International Classification of Functioning, Disability, and Health (WHO, ICF, 2001) provides a framework that studies the interactive relationships between the physical, psychological functions, and the individuals' activity performance in the context of the person's environmental and personal factors (e.g. personal perceptions, belief, and

characteristics, see Figure 1.1.). Two individuals with similar physical functioning and activity participation may have different fall outcomes and require different fall prevention regimens because of their perception of falls and their self-confidence managing falls.

This study aims to examine fall management during aging premised on the Confidence of Self-Management of Falls (CSMoF), which is a very understudied personal factor attributed to reducing the risk of falls and increasing self-protection when falls occur. More specifically, the study intends to predict the co-variance in CSMoF with demographic characteristics, chronic conditions, and personal perception of fall experiences while applying the ICF model (see Figure 1.1). The contextual factors embrace environmental factors and personal factors. Fall prevention studies use fear of falls and fall efficacy interchangeably. This may be due to the mis-conceptualization which uses the two terms interchangeably (Hadjistavropoulos et al., 2011).

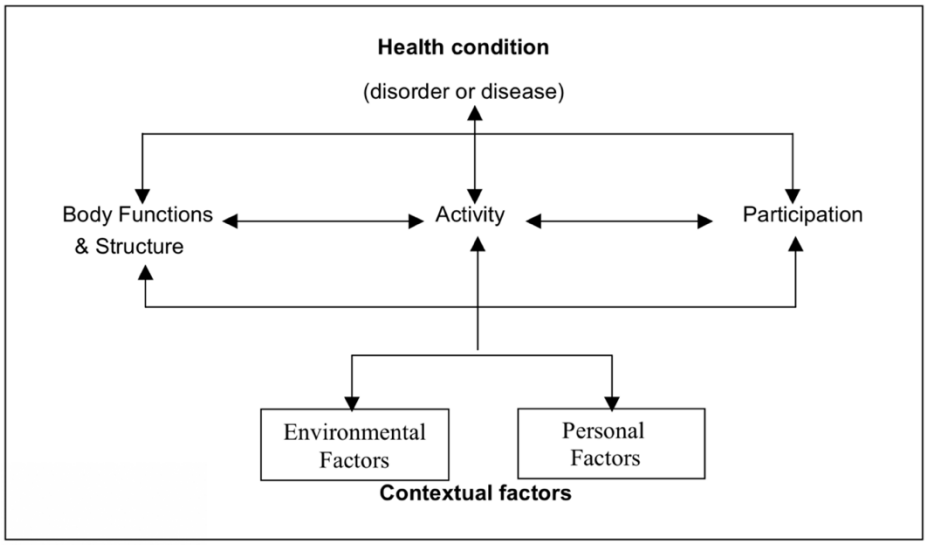

Figure 1.1: ICF Conceptual Model

1.1 Physical Functioning and Demographics Factors in Older Adults' Subjective Perception of Falls

Physical function impact on the perception of falls in older adults by the fact that they are less agile now than at younger ages (Vanos, Herdt, & Lochbaum, 2017). For example. gait

speed was found to be associated with balance self-perceptions of older adults (Talkowski, Brach, Studenski, & Newman, 2008). Moreover, gait speed is also known to be influenced by demographics such as age and socioeconomic status (Rogers, Cromwell, & Newton, 2005; Sund, Svensson, & Andersson, 2017).

Other than gait speed, older adults' participation in fall prevention programs was associated with perception of balance and falls. For example, Liu and So (2008) reported a fall perception modulation effect on older adults who took Tai Chi programs aimed at improving older adults' physical fitness and fall-related perception and they reported that enhanced physical functions improve fall-related perception significantly. Prevailing medical conditions would also influence older adults' perception of one's physical capacity to prevent a fall experience (Bonan, Guettard, Leman, Colle, & Yelnik, 2006; de Oliveira et al., 2008; Jang, Kim & Lee, 2017). Further studies are needed on the role of physical functioning and demographic factors in explaining older adults' subjective perception of falls and their confidence in self-management of falls.

1.2 Subjective Perception of Fall Risk and Fear of Falls in Fall Efficacy

Although usually interchangeable, fear of falls and fall efficacy are independent of each other (Hadjistavropoulos, Delbaere, & Fitzgerald, 2011). Fear of falling refers to "an ongoing concern about falling, which ultimately limits the performance of activities of daily living" (Tinetti & Powell, 1993). Fall efficacy refers to "low perceived self-efficacy at avoiding falls during essential, nonhazardous activities of daily living" (Tinetti, Richman, & Powell, 1990). Hadjistavropoulos et al. (2011) also criticized traditional conceptualizations which only covered avoidance of activity as fear of falls.

Perception of fall risks and fear of falls were both negatively correlated with fall efficacy

(Kumar et al., 2008; Myers et al., 1996). Kumal et al reported strong associations were found between fall efficacy, balance performance, and the actual mobility capacity. Older adults may find that something they thought they could complete may actual be challenging. Frequencies of doing certain tasks or activities predicted older adults' perception of risk for falls (Myers et al., 1996). For hospitalized older adults with disabilities, those who reported low fall efficacy also reported less improvement at discharge (Hellstrom, Lindmark, Wahlberg, & Fugl-Meyer, 2003). There is a need for additional studies on the relative contribution of subjective perception of fall risk and fear of falls in predicting confidence in self-management of falls.

1.3 Interactive Effects between Demographics, Chronic Conditions, and CSMoF

Fall efficacy is both a mediator and a moderator in a model that was used to predict depression with fear of falls (Chou, Yeung, & Wong (2005). Chou et al. found a higher level of fall efficacy mitigated the effects from fear of falls on to depressive symptoms. Similarly, in a fall prevention program using Tai Chi combined with interventions for fall efficacy, significantly reduced fear of falls (Li, Fisher, Harmer, & McAuley, 2005). Studies are needed on the interactive effects between demographics, chronic conditions, and personal perception of falls when predicting the confidence of self-management of falls as well as to determine the extent to which fear of falls and fall history moderate confidence in self-management of falls among older adults in community-based fall prevention programs.

1.4 Statement of Problem

There is a dearth of evidence on how older adults' perception of falls, which in turn is influenced by the history of falls (Rao, 2005), interacts with their self-confidence in managing falls (Bae & Cho, 2014; Kim, 2013). In addition, extant studies tend to focus on the influences of chronic conditions and/or personal factors of fall risk rather than taking a whole person

perspective. There is untapped potential to apply a biopsychosocial factors approach to understanding fall prevention by addressing vulnerabilities and assets at the biologic/structural, activity, participation, environment and personal factor levels.

Just recently, fear of falls has started to increasing research attention. Fear of falls is viewed as a post-fall syndrome that interferes with balance performance, eventually causing augmented risks of falls (Hadjistavropoulos, et al., 2011; Howland et al., 1998; Satatiano & Maus, 2018; Tinetti, Liu, & Claus, 1993). For example, over 50 % of older adults with fall histories reported various levels of fear (Hadjistavropoulos et al. 2011). High levels of the fear of falls would impair older adults' confidence in performing activities they are capable of, confining older adults at home and causing social disengagement (Harding & Gardner, 2009; Legters, 2002).In spite of its influence on falls risk morbidity, fear of falls is under-recognized in fall prevention literature (Denkinger, Lukas, Nikolaus, & Hauer, 2015; Harding & Gardner, 2009).

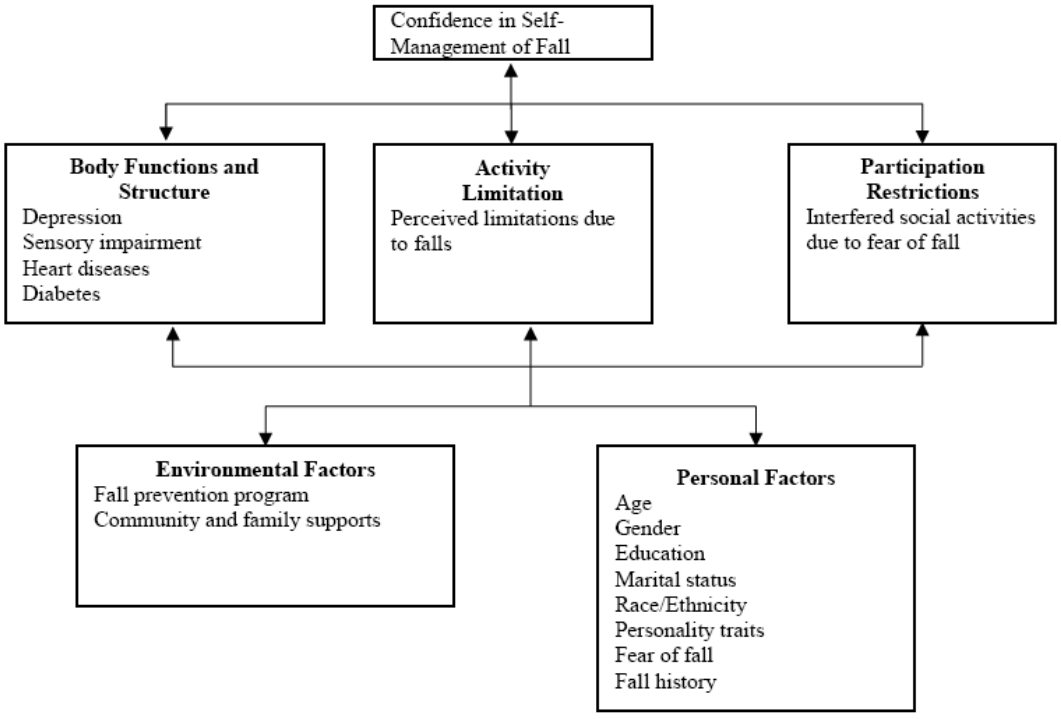

Figure 1.2: Mapping ICF Components in Fall Prevention Study

The ICF model implies that personal factors such as CSMoF are relating to and interacting with internal and external factors including other personal characteristics one possesses, body structure and functions, activities and participation, and environmental factors. As suggested by Mehraban et al. (2013), the contribution of personal factors to the formation of the CSMoF is underestimated. This study sought to predict the CSMoF from personal demographics, history of chronic illness, and perceptions of falling among older adults. Figure 1.2 maps out the ICF components applied to the present perception of falls study.

1.5 Research Objectives

This study explored the relative contribution of physical conditions, activity and participation, and personal factors in fall mitigation. It will seek to determine the predictors of CSMoF in relation to fall risk self-perceptions while controlling for demographics and self-reported health and functioning. The study sought to determine the:

1) Role of physical functioning and demographic factors in explaining older adults' subjective perception of falls and their confidence in self-management of falls.
2) Relative contribution of subjective perception of fall risk and fear of falls in predicting confidence in self-management of falls.
3) Interactive effects between demographics, chronic conditions, and personal perception of falls when predicting the confidence of self-management of falls.
4) Extent fall experience moderates confidence in self-management of falls among older adults in community-based fall prevention programs.
5) Extent the fear of falls and fall history moderate confidence of self-management of falls among older adults in community-based fall prevention programs.

1.6 Research Questions

The study aimed to address the following research questions:

1) To what extent do physical functioning and demographics factors explain the variance in older adults' subjective perception of falls and their confidence in self-management of falls?

2) What is the relative contribution of subjective perception of fall risk and fear of falls in predicting confidence in self-management of falls?

3) What are the interactive effects between demographics, chronic conditions, and personal perception of falls when predicting the confidence of self-management of falls?

4) To what extent do fear of falls and fall history moderate confidence in self-management of falls among older adults in community-based fall prevention programs?

5) How does fear of falls mediate the relationships between identified predictors of confidence in self-management of falls?

1.7 Research Hypothesis

The following hypotheses were tested:

Hypothesis 1 demographic characteristics such as age and gender predict the differences in CSMoF.

Hypothesis 2 Functioning impairment has a negative impact on CSMoF.

Hypothesis 3 Personal factors such as perceived limitation and fall history have a negative impact on CSMoF.

Hypothesis 4 Fall history (e.g., fall frequencies and injuries due to falls) have interactive effects toward CSMoF building.

Hypothesis 5 Fear of falls serves as a mediator through which some predictors have impacts on CSMoF.

1.8 Significance of the Study

Three significance factors are: theoretical, practical and methodological.

1.8.1 Theoretical Significance

Findings from this study may enhance theories on successful aging experiences. They may result with a more comprehensive model that focuses on not only medical and functioning but also personal and environmental context factors. Therefore, the study extends the application of the ICF model from the rehabilitation field over to theories in gerontological studies.

1.8.2 Practical Significance

This study will provide specific factors that are contributing to the variance in the CSMoF. Future fall program designing, and organization could utilize the findings of the study to maximize the potential benefit that participants may receive .

1.8.3 Methodological Significance

This study applies a quantitative statistical methodology that goes beyond the predictive model. The study examines the unique contributions of certain variables (e.g., fear of falls). In addition, mediation and moderation analyses could reveal the working paths from predictors to target outcomes. By doing so, mediators and moderators could become cores of the program as many of the variances actually work through the mediator or moderator.

1.9 Limitations and Delimitations of the Study

This study will use uses a convenience sample. This could be a limitation for the generalizability of the research finding as the composition of the sampling population could not reflect the increasingly diverse U.S. aging population. The target area of the data collection is predominated by well-educated, white, female Americans, which lacks in diversity. . Additionally, most of the measurements of health status and chronic conditions were dichotomous rather than on continuous or ordinal scales, which may bias the statistical power when using multiple regression. Single item measures may misrepresent self-reporting of health statuses or conditions (Milton, Bull & Bauman, 2011; see also Bergkvist & Rossiter, 2007).

1.10 Definition of Terms

- *Chronic health conditions*: The chronic conditions in this study refer to health conditions or diseases that last long period of time and are occurring again and again (Bernell & Howard, 2016).

- *Confidence of self-management of fall (CSMoF)*: This refers to the sense of control of fall-related movements, including the self-perceived ability to get up when falls happen, to reduce falls proactively, to protect oneself when one falls, to prevent falls by increasing strength, and to improve steady capacity.

- *Demographic factors:* Demographic factors are information collected from a human population including ages, gender, education, etc. (Turner, 2006).

- *Fall*: A fall refers to the unintentional movement downward without control.

- *Fall efficacy*: This refers to "low perceived self-efficacy at avoiding falls during essential, nonhazardous activities of daily living" (Tinetti, Richman, & Powell, 1990).

- *Fall prevention:* A program aimed to reduce the fall incidents among older adults over 65 and to enhance their confidence in fall management. (Smith et al., 2012).

- *Fear of falls*: Fear of falling refers to "an ongoing concern about falling, which ultimately limits the performance of activities of daily living" (Tinetti & Powell, 1993).

- *Functional limitations*: The ICF model defines function limitations as a set of indicators for impairments, activity limitations, and participation restrictions (WHO, 2001).

- *Functions*: Physiological and psychological control over anatomical parts of the body. (Turner, 2006).

- *Interaction factors*: A relationship between more than two variables when the effects of the relationship are not simply adding up (Cox, 1984).

- *Mediation effect*: “[mediation effect] is a variable that is in a causal sequence between two variables, whereas a moderator is not part of a causal sequence between the two variables” (MacKinnon, Fairchild, & Fritz, 2007).

- *Moderation effect*: “Moderator variables affect the strength and/or direction of the relation between a predictor and an outcome: enhancing, reducing, or changing the influence of the predictor (Fairchild, & MacKinnon, 2009)”.

- *Physical health*: According to WHO (1995), physical health stands for “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”.

- *Successful aging*: Successful aging refers to achieving a high level of community participation, even with functioning limitations, by maintaining one’s self-efficacy (Cosco et al., 2014).

1.11 Summary and Conclusion

Fall prevention is important for older adults living in community settings. To better understand their experience and to predict the outcome from fall prevention programs, this dissertation aims to analyze the dynamic between personal health conditions, demographics, fall histories, and CSMoF within the ICF model. The findings of this dissertation contribute to theoretical development and practice implications in fall prevention programing with the elderly.

CHAPTER 2

LITERATURE REVIEW

In this chapter, three core themes of literature review are presented. First, the chapter reviews the importance of incorporating the international classification of functioning, health, and disability (ICF) model into aging studies. Second, an overview of concepts in successful aging (SA) and the role of fall prevention in SA are discussed. And lastly, the chapter considers the evidence on fall prevalence, risks, and fall prevention programs, while pointing out the gaps in the evidence.

2.1 International Classification of Functioning, Health, and Disability (ICF) Model

The ICF proposes a whole person approach to understanding the complex interactions between body functioning, activity capacities, the personal environmental interaction (i.e., the P X E effect), and the latent or hidden feedback loops between these systems. These system interactions are important for the design of person-centered rehabilitation interventions, including fall prevention programs. In this case, understanding the co-dependencies among personal demographics, health conditions, and personal perceptions of falls and program outcomes could help design fall prevention programs to reduce the incidence of accidental falls among older adults, thereby improving quality of life among older adults.

2.2 A Need for Holistic Aging Models

As previously noted, the ICF model is a person-centered holistic model for rehabilitation studies and health care interventions that address the complex interactions between functioning, disability, and health (Chan et al., 2009; Mpofu & Oakland, 2010). Unlike the medical model which overemphasizes diagnoses and clinical treatments, the ICF model takes into account the fact that individuals of the same clinical diagnoses may have different rehabilitation support

needs (Mpofu & Oakland, 2010; WHO, 2001). Moreover, it enables cross-disciplinary dialogue among rehabilitation researchers and healthcare practitioners providing a common language for understanding and for rehabilitation support needs (Rimmer, 2006; Stucki, 2005; Steiner et al., 2002; WHO, 2001). In other words, the ICF model suggests that the health condition alone may not fully predict the individual person's outcomes from health promotion programs such as fall prevention.

2.3 Functioning, Health, and Disability

As stated above, the ICF model considers functioning, impairment, and disability while taking into account body functions, structures, activities, and participation in life situations. I Impairment in the ICF model is "deviation" from generally accepted standards rather than etiological changes or dysfunctions. For example, one who could not see things at a distance clearly is considered to have a visual impairment. However, not being able to see things far does not mean that one has an eye disease or a disorder. In other words, differences in visual perception are to an extent, explained by a deviation from the public perception of "normal" functioning rather than an underlying physiological difference.

Appling the total person ICF model to successful aging studies is particularly important because older adults with disabilities, chronic conditions, or other forms of impairment or functional limitations require rehabilitative and other community participation support unique to their personal characteristics and their life situations. For example, a medical model would focus primarily on chronic health conditions with aging and not the good aging outcomes of community participation and quality of life in the everyday environment and the autonomous motivation of the older person to engage in health promotion activities such as fall prevention programs and outdoor mobility .

2.4 Definitions of ICF Components

2.4.1 Body Functions and Structure

Body functions within the ICF model (Fig 1.2) refer to physiological and psychological functions and Body Structure stands for anatomical parts of the body. By viewing body structure and functions together, the definitions of impairment and disability have also been updated, with impairment referring to "significant deviation or loss" in body structure and function and disability serving "as an umbrella term for impairments, activity limitations or participation restrictions." (WHO, 2001, p.12). The classification of functions ranges from (a) loss or lack, (b) reduction, (c) addition or excess, and (d) deviation. The body functions and structure should not be reviewed in isolation but be completed along with the Activities and Participation sections.

2.4.2 Activities and Participation

The ICF Activities are defined as when one completes a task or an action such as walking, eating, or reading. Participation in the ICF model is defined as the involvement in a life situation. With one performs an action in a given situation, the ICF model compares a "generally accepted population standard" to individuals with various health conditions and proposes terms such as impairment, activity limitations, and participation restrictions (Mpofu & Oakland, 2010; WHO, 2001, p.14). The difference between activity and participation is unclear, and sometimes are used interchangeably (Threats & Worrall, 2004). For example, Jette, Haley, & Kooyoomjian (2003) did a study trying to distinguish activity from participation and concluded that there was no single concept or domain that distinguished between the two components.

2.4.3 Environmental Factors

Environmental Factors are at two levels:: individual and societal. The first layer is the individual environment one interacts directly on regular basis , including home and workplace.

Environmental Factors in this layer usually refers to immediate contact with individuals as well as the people surrounding them (e.g., family members and friends). The societal layer addresses "the formal and informal social structures, services and overarching approaches or systems in the community or society that have an impact on individuals." (WHO, 2001, p.17). This layer of environmental factors relates to most of the living contexts that one may interact to within their social lives, including working environment, community activities, government agencies, health care services, communication and transportation services, social regulations, laws, attitudes, and even ideologies. All the individual and societal factors are classified as either facilitating or hindering individuals function in given situations.

2.4.4 Personal Factors

Personal Factors refer to specific demographic features one possesses other than a health condition or health status (WHO, 2001). They presently do not have a classification system in the ICF model. However, rehabilitation research studies distinguish between fixed personal factors and modifiable person factors (Geidl, Semrau, & Pfeifer, 2014) Examples of fixed personal factors include gender, race, age, while modifiable personal factors include fitness, religion, lifestyle, habits, upbringing, coping styles, social background, education, profession, past and current experience, individual psychological assets, and other health conditions (WHO, 2001, p.17).

Mehraban, Mackenzie, Byles, Gibson, and Curryer (2013) have identified that some significant risk factors for falls were health conditions (body structures), functional limitations (activities and functioning), and home hazards (environmental factors) utilizing the ICF model. Mehraban et al. (2013) further suggested that without using the ICF framework, the contribution of personal factors is at risk of being underestimated. When applying the ICF framework to fall

prevention programs, most of the previous programs paid attention to physical weaknesses (Luukinen et al., 2007) and psychological issues such as fear of falls (Bertera, & Bertera, 2008). However, to our best knowledge, not many studies have focused on the CSMoF that includes self-protection and willingness to change. For those studies that have explored fall-related confidence such as balancing confidence and fall efficacy, their measurements entail questions of performing activities without falls instead of confidence in self-protection.

2.5 Theories on Successful Aging

Successful aging is not a new concept. Rowe and Kahn (1987) proposed three key components in the successful aging model: "(a) low probability of disease and disease-related disability; (b) high cognitive and physical functional capacity, and (c) active engagement with life." Among the three components, a low probability of disease covers more than the state of being disease-free, but also to avoid risk factors for diseases. A high functional level indicates both physical and cognitive capacities of what an older adult wants to do and actually does. Active engagement with life is a two-fold concept. It comprises interpersonal relationships and productive activity regardless of whether it is paid activity or not. A recent development of this model which reflects the Rowe-Kahn model focuses on the years an older adult can expect to live without disabilities and is called Activity Life Expectancy (ALE).

The Rowe-Kahn model has received criticism for its biomedical emphasis. Its explicit exclusion of disabilities and diseases prevents older adults with disabilities or health conditions to achieve the successful aging proposed in the model (Strawbridge, Wallhagen, & Cohen,2002). Boudiny (2013) argued that calling older adults without disabilities "successful" automatically categorizes those with disabilities and health conditions into the "unsuccessful" group which

may cause self-depreciation for those with conditions. Baltes and Carstensen (1996) criticized the model for its negligence to the potential life course impacts on successful aging.

To include disabilities, function limitations, and other health conditions into the successful aging model, the Selection Optimization Compensation (SOC) model recognized the heterogeneity of the aging population and argued that older adults may perceive successful aging differently. It further suggested that older adults with disabilities would "Select" to "Optimize" expectations and make sure of their achievability, which is considered as a "Compensation" of functioning lost or limitations (Baltes & Baltes, 1989; Baltes & Smith, 1990). Disabilities and health conditions were no longer hinders of successful aging. The functional limitations were considered as losses which could be compensated by coping skills. Likewise, having a disabling condition will not be viewed as an unsuccessful aging indicator but as a loss that needs to be compensated by adjusting expectations and behaviors. Thus, older adults with functional impairments may focus on remaining capacity and strive to achieve the most expected outcome based on the capability (Baltes & Baltes, 1989). For older adults who think they are facing risks of falls, many of their fears could be dealt with by a confidence in fall management intervention which also would mitigate management of the fears.

More recently, studies used the WHO ICF model to conceptualize successful aging. For instance, Wilkie, Peat, Thomas, and Croft (2007) examined factors associated with participation restrictions for older adults living in community levels and concluded that mobility limitations strongly impact their level of participation.

Accidental falls are one of the top causes of mobility limitations (Satatiano & Maus, 2018). The next section considers the evidence on fall among adults and related fall mitigation variables.

2.6 Falls among Older Adults

Falls are likely to be fatal and costly for adults over 65 years old (Sleet, Moffett, & Stevens, 2008; Stevens et al., 2012). Studies report that approximately one-third of older adults experience falls each year (Centers for Disease Control and Prevention [CDC], 2016). About 2.8 million US older adults utilize emergency services each year due to unintentional falls and over eight million patients are hospitalized because of fall-related injuries (CDC, 2016; Fitzharris, Day, Lord, Gordon, & Fildes, 2010; Hammer, 2010; Sleet et al., 2008). Fall-related medical service costs soared from $19 billion in 2000 to $31 billion in 2005 and are projected to surpass $50 billion by the end of 2020 as baby boomers start stepping into the aging population (NCIPC, 2016).

2.6.1 Fall and Disabilities

Falls also cause disabilities or functional limitations among older adults. For instance, an estimated 90% of hip fractures result from falls, leading to limited mobility (Satatiano & Maus, 2018). Additionally, the fall-related death rates for older adults increased from 43% in 2005 to 58% in 2014 (CDC, 2016). This statistic shows the high prevalence of falls among older adults.

2.6.2 Fall Risks

Rubenstein (2006) classified nine risk factors by their magnitude and how they contribute to fall incidences: (a) lower limb weakness; (b) balance deficit; (c) gait abnormalities; (d) visual impairment; (e) mobility limitation; (f) cognitive impairment; (g) impaired functional status; (h) postural hypotension; and (i) fear of falling. In addition, Tientti and Kumar (2010) listed previous falls, balance impairment, and decreased muscle strength as the top three risk factors of falls for the aging population.

2.6.3 Fall Prevention Programs

Fall prevention programs are beneficial to older adults (Bjerk, Brovold, Skelton, & Bergland, 2017). They do so through increase physical strength, gait, balance, and function.. The major interventions include physical exercises and activities enhancing physical functioning (Luukinen et al., 2007; Skelton, Dinan, Campbell, & Rutherford, 2005; Smulders et al., 2010). For instance, Tai Chi, a traditional Chinese martial skill, has shown evidence to reduce the risk of falls through gait or balancing training and muscle strengthening (Li, 2014). This complementary therapy also improved orientation ability, gaze stability, and locomotion after program completion (Li, 2014; Li & Harmer, Liu, & Chou, 2014; Wolf et al., 1996).

2.6.4 Nature and Types of Fall Prevention Programs

Completion status in short-term fall programs tend to fall into one of three categories: inadequate (1 to 4 sessions), adequate (5 to 7 sessions), and complete (8 sessions; Smith et al., 2012). However, completion rates among older adults in short-term fall prevention programs are relatively low because about 33% of the participants tend to drop out of the program. Osho, Owoeye, and Armijo-Olivo (2018) provided recommendations that stated that programs with adherence greater than 80% may result in more reduction of fall risks than those with lower adherence. In this light, to retain participants in the fall prevention programs should be considered an indispensable goal. As older adults drop out, programs become less beneficial for the overall target population and become less cost-effective as reported to funders. This study aimed to explore the predictors and factors associated with the levels of completion for a short-term fall prevention program with a community agency.

In acute care programs, communication and administrative procedures for recruitment are vital in preventing older adults from dropping out and clinical diagnoses is a good predictor for

older adults' willingness to participate. However, in order to achieve the total participation rate, smooth communication is a key factor (Wu et al., 2013). Communication smooths the exchange of information regarding fall risks and fall management among older adults in fall prevention programs. After having good quality conversations, , older participants seem to have better outcomes in fall and fear reduction (Carroll, Dykes, & Hurley, 2010; Ungar et al., 2013).

2.6.5 Role of Social Support

Social support is protective in combating falls (Schott & Tietjens, 2019). For instance, family members, friends, and people living in the same community can assist in identifying and spotting fall risks for older adults (Schott & Tietjens, 2019). Three levels of social supports have been identified : social inclusion, perceived supports, and enacted supports (Durbin, Kharrazi, Graber, & Mielenz, 2016; Pin & Spini, 2016). Furthermore, social support enhanced fall prevention efficacy among older adults (Schott & Tietjens, 2019). Schott and Tietjens (2019) examined the relationship between social support, fall efficacy, physical activities, and falls. They concluded that older adults with social support including emotional and tangible supports and social integration showed a higher level of fall efficacy. Other than predicting fall prevention outcomes and fall efficacy, social supports (including those from families, institutions, and communities) are strong predictors for participants to complete fall prevention programs (Lippens and Mackenzie, 2011). It is noteworthy to mention that personal factors and mental health also contribute to the variance in perceived social supports among older adults. For example, personal beliefs and outlook tend to bias the level of perceived social supports so aging anxiety and depression are negatively associated with perceived social supports (López-Martínez, Esteve-Zarazaga, & Ramírez-Maestre, 2008; Vinokur, Schul, & Caplan, 1987).

2.6.6 Physical Conditions

Physical functioning plays a crucial role in preventing falls among older adults (Viken et al. 2018), and also retaining older participants into physical exercise programs (Campbell et al., 1997). For instance, Viken et al. (2018) reported that the participants who dropped out of a fall prevention program were mostly those with low grip strength and low cardiorespiratory fitness. Physical functioning impact older adults' gait balance and limb strength, which is directly related to the outcome of fall prevention programs (Tiedemann et al., 2015). As examples of physical functioning, that impair fall safety, about 30% of the older adults reported visual limitations and 40% reported hearing loss (Tideiksaar, 2002), which would increase their risk for falls Visual limitations can limit older adults' fall efficacy because they may not notice potential risks like a wet rug or water on the floor (Grue, Kirkevold, Mowinchel, & Ranhoff, 2009). Hearing issues, from another perspective, can prevent older adults from getting information about dangers such as an alarm or a warning from others (Jiam, Li, & Agrawal, 2016; Lin, & Ferrucci, 2012). Further studies are needed on the relationship between physical conditions and fall efficacy regarding self-protection.

2.6.7 Personal Factors

Personal characteristics and perceptions are crucial to both fall prevention and fall prevention program retention for older adults. For instance, Herman et al. (2009) reported anxiety and life satisfaction predict fall prevention program completion regardless of physical health conditions. Experience of high anxiety is associated with high fear of falls, which could lead to activity avoidance (van Haastregt et al., 2008; Painter et al., 2012). The evidence is inconclusive about the effects of personal factors on programs aimed to enhance the fall efficacy and confidence in self-management of falls.

2.6.8 Demographics and Fall Prevention

Low socioeconomic status was found to be negatively associated with physical exercise and fall prevention participation (Merom et al., 2012). For example, older adults who had less than a high school education reported lower levels of engagement in balance activities or practices. Additionally, older adults who had a lower income tended to be less engaged in fall prevention (Merom et al., 2012). Gender also differentiated between fall prevention related behaviors. For example, women were more likely to discuss falls and fall prevention or to seek medical assistance compared to men (Stevens et al., 2012). The gender difference even reached out to family members because women who had fallen were more likely to encourage family members to participate in fall prevention programs whereas men usually did not usually play such roles (Hill & Stinson, 2004). Sandlund et al. (2018) reported a fun finding that said women were more likely to start a fall prevention program by reading and men by practicing.

Ethnicity groups have some effect on the outcome of fall prevention programs. Hispanic participants were more likely to benefit from prevention programs even if the program was designed for other populations (Landy et al., 2012). However, there is need for further studies on the relationship between demographic factors and fall efficacy, especially to examine the causal relationship between demographics and outcomes because demographic characteristics are not easy to change.

Smith et al. (2012) found that older adult females were less likely to complete a fall prevention program. Studies further explained this disproportion was because females may have a lower level of dynamic gait (Herman et al., 2009). Moreover, racial minorities were at a risk for dropping out of and receiving less benefit from fall prevention programs because language

barriers and cultural disparities impact the retention rate (Mielenz, Durbin, Hertzberg, Nobile-Hernandez, & Jia, 2017).

2.7 Physical Functioning and Fall Prevention

Physical weakness and balance deficit are shown to impact fall experiences the most. In addition, the two risks usually appear together as weaknesses of the lower limb substantially decrease the ability to maintain balances (Moreland, Richardson, Goldsmith, & Clase, 2004). However, physical-related trainings among older adults living in community settings were found to be very limited in that only about six percent of older adults over age 65 engaged in balance-related programs (Merom et al., 2012).

Low physical functioning tends to create a loop in which gait impairment causes avoidance of activities and lack of activities in turn, weaken the physical functioning (Myers et al., 1996). Specific physical function conditions associated with higher risk for falls include osteosarcopenic obesity (Hita-Contreras, Martínez-Amat, Cruz-Díaz, & Pérez-López, 2015; Jeon, 2013; Madigan, Rosenblatt, & Grabiner, 2014; Mitchell, Lord, Harvey, & Close, 2015), weak lower limb strength (Cho, Bok, Kim, & Hwang, 2012; Gooday & Hunter, 2004; Maki & McIlroy, 2006), and diminished muscle strength (Cho & An, 2014; Granacher, Gollhofer, Hortobágyi, Kressig, & Muehlbauer, 2013; Trudelle-Jackson, Jackson, & Morrow, 2006). However, existent literature is limited in the area between physical conditions, fall prevention, and fall efficacy. This study aims to mitigate this literature gap by examining that relationship.

2.7.1 Chronic Conditions and Fall Prevention

Chronic health conditions also have a significant impact on fall experiences as they may limit the activities older adults engage to age successfully (Herndon et al., 1997; Moylan, & Binder, 2007; Richardson, Bennett, & Kenny, 2014). Chronic conditions and their comorbidities

also tend to increase falls among older adults. Sibley, Voth, Munce, Straus, and Jaglal (2014) identified 13 chronic diseases that increase falls among older Canadians over age 65. These include hypertension, arthritis, vision impairment, heart diseases, and others. For example, older adults diagnosed with diabetes encounter a higher level of fall risks that include reduced walking performance and declining cognitive functions (Roman de Mettelinge et al., 2013).

Besides chronic conditions, medications for treating chronic diseases among the aging population may also increase the risks of falls through polypharmacy (De Groot et al., 2016; Ming & Zecevic, 2018; Woolcott et al., 2009). For example, Parkinson's disease (PD) and the medications used against it are both potential causes of falls (Huang, Karter, Danielson, Warton, & Ahmed, 2017; Vestergaard, Rejnmark, & Mosekilde, 2008). Although there seem to be no clear evidence-supported interventions for polypharmaceutical effects, Huang et al. (2017) suggested taking into consideration chronic diseases in fall prevention studies. It remains understudied as to which chronic condition has impact on fall efficacy, to what extent, and whether mediators exist between chronic condition and fall efficacy.

2.7.2 Psychological Conditions and Fall Prevention

Sohng, Moon, Song, Lee, & Kim (2003) conducted a fall prevention study in Korea among older adults with depression. They found that depression and fall prevention were mutually beneficial because increased muscle strength and reduced falls predicted a lower level of depressive symptoms. On the other side, reduced depression also enhanced the outcome of fall prevention through physical training. Yet, the findings regarding the simultaneous reduction of fall risk and depression were mixed. Sjösten, Vaapio, & Kivelä, (2008) asserted that depressive symptoms were not significantly reduced in fall prevention programs. Sjösten et al. (2008)

further suggested applying a multifactorial approach (e.g., Tai Chi) to reduce falls and to increase the fall prevention outcome.

Older adults with cognitive impairment were at elevated risk for falls (Jensen, Nyberg, Gustafson, & Lundin-Olsson, 2003). For instance, older participants with low cognitive function were less likely to benefit from prevention programs (Jensen et al., 2003). This finding was in line with previous studies that stated cognitive impairment should considered in fall prevention programs for older adults (Shaw, 2002). In their systematic review, Winter, Watt, and Peel (2013) examined 11 fall prevention programs that included older adults with cognitive conditions and found only two of them reported statistically significant improvement. A gap in knowledge remains about cognitive conditions and their impacts on fall efficacy.

2.7.3 Mobility Safety and Successful Aging

Movement, mobility, and mobility safety are crucial to achieving successful aging (Buchner, 1997). Compared to other conditions, movement and mobility are the functions that would be immediately noticed once lost because mobility reflects a set of functions that include muscle performance, balancing, and body control (Buchner, 1997). Similarly, Strawbridge, Cohen, Shema, & Kaplan (1996) also found that older adults who reported walking often had a higher probability of successfully aging. The early literature on successful aging (e.g. Strawbridge et al., 1996) demonstrated the importance of mobility and mobility safety for successful aging. For instance, Rikli (2005) considered mobility as a physical activity and examined its role in successful aging among older adults. Rikli (2005) found that one of the reasons older Americans do not consider themselves as successfully aged was due to living sedentary lifestyles. Yet, because Americans are living longer, they need to secure their mobility as long as possible. A recent study by Lowry, Vallejo & Studenski (2012) also advocated the

core role of mobility in successful aging. Mobility was related to social activities, community engagement and inclusion, social participation, etc. (Lowry, Vallejo, & Studenski, 2012). The question remains about the possibility whether older adults with chronic conditions or physical functional limitations can achieve mobility safety and successful aging.

2.7.4 Diversity in Population and Fall Prevention

As mentioned above, the American society becomes more diverse than ever. This means the findings of previous studies, which were derived from predominantly white samples, may not be generalized on this diverse America. Only a few studies considered diversity in populations. For example, Borschmann et al. (2010) addressed cultural and linguistic barriers for a diverse older population of fall prevention programs while Kosma (2014) examined successful exercise programs for older adults from diverse backgrounds. Both studies reported that adversity considerations important to fall prevention intervention outcomes. Kosma and Cardinal (2016) reported similar findings. Similarly, Haas and Haines (2013) concluded that differences in language, cultural, education attainment, behaviors, and lifestyles would eventually influence the outcome of fall prevention programs.

2.8 Fear of Falls

Fear of falls stands for long lasting concerns regarding falling which limits individual's normal activities (Tinetti & Powell, 1993). Murphy, Dubin, and Gill (2003) conducted a study, examined who and why fear of falls appears, and concluded that older women living in the community were more likely to develop fear of falls. Fall history also predicted fear of falls for females. Being afraid of falls or having fallen in the past year were found to negatively contribute to older adults' fall prevention participation (Merom et al., 2012; Murphy et al., 2003). The relationship between reduced fear of falls and reduced falls were mixed as some

studies reported reduction for both (Kwon, 2010; Kwok, Mamun, Chandran, & Wong, 2011) and some claimed the two variables were independent (Legters, 2002; Maki, Holiday, & Topper, 1991). Given the unclear role of fear of falls in fall prevention programs and outcome prediction, studies should give more attention on the role of fear of falls in future studies.

2.9 Summary and Conclusion

Through the literature review, one can summary that a substantial amount of studies has been done on successful aging experiences among older adults, especially on mobility safety. Fall prevention programs have been widely applied to combat falls among the older populations. Falls risks mainly include physical conditions and functions, psychological conditions, fear of falls, and fall efficacy.

However, fear of falls and fall efficacy have used interchangeably when fall efficacy and fear of falls are two different concepts. Therefore, the two concepts should also be studied separately rather interchangeably. In addition, the traditional fall efficacy studies focused on mostly avoidance of falls when performing certain types of activities yet did not include actions and activities of self-protections in situations in which falls do happen.

This study aimed to examine the relationship between fall efficacy and the confidence in self-management of falls. The ICF model framework guided the study. It includes physical conditions of older adults as well as demographics and personal beliefs regarding falls.

CHAPTER 3

RESEARCH DESIGN AND METHODS

This chapter discusses the research design, sampling approaches, methodology, the data analytic strategies, and the measurements of variables for this study. While applying the ICF model to successful aging, the study utilized a cross sectional design to examine the effects of physical functioning and demographic factors on the variance in older adults' subjective perception of falls. It also examined the effects of their confidence in self-management of falls, the contribution of fear of falls to CSMoF, internal interactions between identified predictors, and the role of fear of falls and its working mechanism. With a sample drawn from a community fall prevention program, the study tested five hypotheses predicting the variance in CSMoF accounted for by demographic characteristics such as age and gender functioning impairment, personal factors such as perceived limitations, fall history, and the interactive effects as well as mediator effects among the predictor variables. The study utilized single item measures (e.g., for chronic condition measurements) and multiple item measures (e.g., for confidence in self-management of falls) with a group of adults attending a community fall prevention program.

Fall risk factors of interest were age, living arrangement, gender, ethnicity, education, marital status, persons in household, arthritis, breathing issues, depression, diabetes, heart diseases, vision limitations, limitations, fall frequencies, injury history, fear of falls, and overall health status. The outcome (dependent variable) is the CSMoF of participants.

3.1 Research Design

This study utilized a cross-sectional design to examine relationships between personal factors, health conditions, chronic conditions, and perception of falls and how they influence the confidence of self-management of falls among older adults who participated in the fall

prevention program called A Matter of Balance. Levin (2006) described cross-sectional studies as “investigating associations between risk factors and the outcome (p. 24)” at a single point in time. A cross-sectional design was appropriate for this study to identify predictors for the CSMoF among older adults in fall prevention programs at a point in time. This research was conducted at a single point in time in which the data was collected via surveys distributed to the participants during enrollment into the fall prevention program.

3.2 Sampling Frame

A sample frame refers to “the listing of the units from which a sample is to be selected” (Turner, 2003). The sampling frame for this study includes all the agencies that provide the fall prevention program, A Matter of Balance (AMOB). The AMOB provides physical exercises to increasing muscle strength, behavioral modification of fall-related habits, identifications of fall hazards, cognitive improvements on fear of falls, restoration of confidence of self-management of falls, and enhancement of communication between older adults and clinical service providers (Smith et al., 2012; Mielenz et al., 2017). The AMOB enrollment is open to (1) anyone concerned about falls; (2) anyone interested in improving balance, flexibility and strength; (3) anyone who has fallen in the past; and (4) anyone who has restricted activities because of falling concerns. While the objectives of this study focused on older adults, the exclusive criteria were (1) age 65 or older; (2) cognitively competent to fill out the surveys; (3) normal mobility (independent walker, or with canes) because older adults with very limited mobility functions do not typically participate in fall prevention programs; and (4) capacity to understand the interventions with sufficient language proficiency.

The population for this study (N = 737) was all of the older adults who are over age 65 at the time of enrollment. Four Texas counties held the AMOB programs Collin, Denton, Ellis, and

Parker. . All the AMOB programs are run by the Area Agency on Aging in Arlington, Texas. Collin County and Denton County held the most sessions of the program and were the core area of the data collection.

Older adults who were younger than age 65 were not included in the study as the scope of the study was for the population age 65 and above. Older adults with cognitive functioning limitations and those who were not able to understand the instructions of the program sessions were also excluded from the study as well as those who did not meet minimal English or Spanish proficiency... In addition, , participants who did not provide the form of informed consent, did not complete the registration form, did not fill out the pre-survey, or filled out a survey but had more than 70% of the values missing would also be excluded from the current dissertation study. Once all of the above exclusions were removed from the total population number, a sample size of $N = 691$ remained for the study.

3.3 Study Sample or Participants.

Table 3.1 presents demonstrates the demographic characteristics of participants.

Table 3.1: Participant Characteristics ($N = 691$)

Demographic Variables		*n* (%)	*M* (*SD*)
Age			76.23 (6.44)
Living alone	Yes	229 (33.1)	
	No	462 (66.9)	
Gender	Male	165 (23.9)	
	Female	526 (76.1)	
Hispanic	Yes	17 (2.5)	
	No	674 (97.5)	
Ethnicity	American Indian or Alaska native	4 (0.6)	
	Asian American	20 (2.9)	
	Black or African American	10 (1.4)	

(table continues)

Demographic Variables		*n* (%)	*M* (*SD*)
	Native Hawaiian or other Pacific native	3 (0.4)	
	European American	654 (94.7)	
Education	Less than high school	2 (0.3)	
	Some high school	4 (0.6)	
	High school graduated or GED	67 (9.7)	
	Some college or vocational school	220 (31.8)	
	College graduated or higher	398 (57.6)	
Marital status	Married	400 (57.9)	
	Widowed	190 (27.5)	
	Divorced	70 (10.1)	
	Separated	3 (0.4)	
	Other	28 (4.1)	
Persons in household	1	229 (33.1)	
	2	426 (61.6)	
	3	20 (2.9)	
	4	4 (0.6)	
	5	2 (0.3)	
	6	1 (0.1)	
	Did not report	9 (1.3)	

3.4 Power Analysis

Power analysis refers to the probability that a study would find statistically significant results (Cohen, 2013). Cohen suggested doing a priori for sample size determination based upon the statistical analyzing approaches. Before the data analyses, the sample size power was pre-determined by using G*Power software (Faul, Erdfelder, Buchner, & Lang, 2009). Power was set at level of .99, with a *αalpha* level set at .05 with 19 predictors including demographics, chronic conditions, and perceptions of falls. Effect size was set at medium (f^2 = .15). Cohen (1992) described effect size as an indicator of the probability that a statistically significant results will yield from a given population. The minimal sample size with the set of parameters was 279.

3.5 Measures

3.5.1 Demographic Variables

Demographic characteristics to be included for study include age, whether living alone (yes or no), gender (male or female), Hispanic (yes or no), race (1 = American Indian or Alaska native; 2 = Asian American; 3 = Black or African American; 4 = Native Hawaiian or other Pacific native; and 5 = European American), level of education (1 = less than high school; 2 = some high school; 3 = high school graduate or GED; 4 = some college or vocational school; and 5 = college graduate or higher), marital status (1= married; 2 = widowed; 3 = divorced; 4 = separated; and 5 = other), and persons in household.

3.5.2 Chronic Conditions

Dichotomous coded (*yes* or *no*) chronic conditions were collected, including Arthritis, Breathing Conditions, Depression, Diabetes, Heart Diseases, and Vision Limitations.

3.5.3 Personal Perception of Falls

Participants were asked whether (*yes* or *no*) they perceived limitations of social activities due to the concerns of potential falls and sequential injuries. Fall history was measured with the number of falls in the previous three months and the injuries resulted from those falls. Fear of falls was measured by a 4-point Likert scale range from 1 (*Not at all*) to 4 (*A lot*).

3.5.4 Health Status

Participants self-rated their present health status on a 5-point Likert scale from 1 (*Poor*) to 5 (*Excellent*).

3.5.5 The Confidence in Self-Management of Falls (CSMoF).

The CSMoF scale was adapted from the pre-survey of A Matter of Balance and measured

by a 5-item Likert scale. Participants rated the degree of agreement to given statements from 1 (*Not at all sure*) to 4 (*Very sure*). The total possible score for this scale was 20, with higher total points referring to a higher level of CSMoF. The Cronbach's Alpha of CSMoF scale was .837. A confirmatory factor analysis (CFA) was performed to verify the validity of measurement. All the five items loaded statistically significant on a single CSMoF dimension, and the fit of model was satisfactory: $\chi 2(4) = 14.04$, $p = .007$, RMSEA = .06, and CFI = .993 (Acock, 2013), indicating a good validity of measurement.

3.6 Procedures

The original surveys were stored in a locked cabinet with keys to be stored elsewhere. In order to do follow-ups, participants needed to provide their names and contact information on the survey, which was not collected when they were entered into an electronic version.

The student investigator went physically to the AAA office for data entering because the surveys would not be taken out of the AAA office for data safety reasons. All the data were de-identified for the analysis. As noted above, participants with no informed consent were removed from the data collection.

3.7 Data Cleaning and Data Analyses

The data analyses were performed on STATA 15.0 and the Statistical Package for Social Science (SPSS) 24.0. SPSS was also used to manage raw data. Data analyses included preliminary data cleaning procedures, descriptive statistics, simultaneous regression modeling, interaction analysis, and mediation analyses via path model. Data cleaning processes examined cases with extensive missing values and then reviewed each variable separately. Missing percentages and patterns were identified. Descriptive statistics contained all the dependent and independent variables. The investigator also tested statistical assumptions including

distributional normality, multicollinearity, homoscedasticity, and variable inflation factor (VIF).

3.7.1 Missing Values

Missing data is common among data analysis and social studies and therefore, should be carefully examined (Tabachnick & Fidell, 2007). The investigator first inspected the missing values and reported the cases of missing data, missing patterns, and missing data handling approaches.

Each variable had missing data for between six and 23 cases, with none of the variables having missing cases for over 10% of the total cases. Little's missing completely at random (MCAR) test was first conducted and yielded statistically significant results, N = 691, $\chi 2$ = 42.08, df = 20, p = .003, rejecting the null hypothesis that the pattern was missing completely at random. Based on the recommendation by Acock (1997), the missing cases were coded 0, and non-missing cases were recoded to 1. A binary correlational analysis of the recoded variables was then conducted and reported no statistically significant correlation between the recoded variables, indicating that the pattern of missing data was likely to be missing at random (MAR). Mean substitution was made for continuous variables (e.g., age, household, and CSMoF), and mode substitution was applied for dichotomous and ordinal variables (e.g., education, marital status, and health status; Stegmann, 2017).

3.7.2 Outliers

Outliers could be impactful for statistical analyses that use mean values as outliers bias the mean value of a data set (Hair, Anderson, Tatham, & Black, 1998). The investigator further examined the outliers for the data set using Grubbs' test (extreme studentized deviate [ESD]). The ESD examines the statistical significance of one value differs from the rest (Grubbs, 1969; Stefansky, 1972).

The 316th case was identified as having the furthest deviation from the others, yet was still not statistically significant, $z = 2.67$, $p > .05$, indicating no outlier was identified.

3.7.3 Statistical Assumptions

The investigator examined all the predictors, dependent variable, and criterion variables to make sure that data entry was accurately done. All the participants' data were correctly entered and de-identified. All the retained cases met the inclusion criteria noted above and had signed information consent forms. . The multicollinearity was inspected by examining the variance inflation factor (VIF). No VIFs were greater than 5, indicating that multicollinearity was not likely to interfere with the interpretation of statistical results.

D'Agostino's test was used to check the normal distribution, skewness, and kurtosis. CSMoF, the dependent variable, and continuous predictors were normally distributed, while skewness ranged from 0.15 to 2.06 and kurtosis ranged from 2.38 to 2.67 (George & Mallery, 2010). The normality of the dependent variable is crucial and was tested. It yielded a $\chi 2$ (2) = 3.52, $p = .17$, failing to reject the null hypothesis that the variable is normally distributed. Linear relationship was visually inspected by scatter plots between dependent variable and predictors. In sum, the statistical assumptions were met for multiple regression, path analyses, and related analyses.

3.7.4 Data Merging

A series of chi-squared tests by using cross tables were conducted to test the homogeneity of the sample cases collected from different counties. If no statistically significance was found across sample cases from various counties, then the data sets would be merged as a single data set.

The series of chi-squared tests were made across the four counties from which the

participants came. No statistical significance was found, the *p* values for the χ^2 tests ranged from .104 to .858, indicating that the minimum cell frequency was met, and no significant difference was found across the four sample groups. The four sample groups were then merged into a single data set.

3.8 Simultaneous Regression

A linear regression model builds an equation that predicts the dependent variable with a series of independent variables by calculating the conditional probabilities (Tabachnick & Fidell, 2001). Three simultaneous regressions were conducted to determine the predictors of the CSMoF from demographics, factors, chronic conditions, and perception of falls (Hoyt, Imel, & Chan, 2008; Hoyt, Leierer, & Millington, 2006). The perception of falls simultaneous regression utilized predictor variables: (a) limitations; (b) fall frequencies; (c) injury history; and (d) overall health status. CSMoF served as the dependent variable for all three regression models. The demographic simultaneous regression was conducted with predictor variables: (a) age; (b) living alone; (c) gender; (d) Hispanic (e) ethnicity; (f) education; (g) marital status; and (h) persons in household. The chronic condition simultaneous regression was conducted with: (a) arthritis; (b) breathing issues; (c) depression; (d) diabetes; (e) heart diseases; and (f) vision limitations. The statistically significant predictors from the individual regressions were entered into the final regression analysis to determine the contribution to the association between predictors and CSMoF.

3.9 Hierarchical Regression

Hierarchical regression examines not only the contribution of each of the independent variables, but it also provides information regarding the unique contribution brought by the variable(s) added into the prediction model from the last addition (Cohen, Cohen, West, &

Aiken, 2013). All the predictors that are statistically significant in separate simultaneous regression models were added to the final model, excluding fear of falls which as subsequently added as the second block modelling. The changes of regression coefficients (*B*) and standardized beta weights (β) were reported with the change of R squared (ΔR^2) and adjusted R^2. The changes, especially becoming smaller, of *B* and β indicated mediation effects (Hayes, 2017). The ΔR^2 stands for the change of the percentage of the variance in dependent variable explained by adding the predictor(s) and an increase of adjusted R^2 suggests that the additive predictor(s) were helpful in explaining the dependent variable.

Moreover, collinearity diagnostics were computed prior to conducting the regression analysis to ensure that the zero-order correlations were below the threshold level of concern ($r \leq 0.80$), that the variance inflation factors did not exceed 10, and that the tolerance values were close to one. In addition, as checks for the stability of regression coefficients, we applied the sequence of simple slope tests for the regression model and the rescaled mean-centered values. To counter the probability of Type I errors, the significance value was set at the 95% confidence interval level ($p \leq 0.05$). For effect size magnitude interpretation, we then computed Cohen's f^2, which is an index of local effect size (i.e., one variable's effect size within the context of a multivariate regression model). We considered parameters for the correlation coefficients as a small effect when $f^2 \geq 0.02$, a medium effect when $f^2 \geq 0.15$, and a large effect when $f^2 \geq 0.35$.

3.10 Mediation Analysis

Unlike traditional mediation analyses, the analysis applied a path model to explore the mediation relationship between fear of falls and the CSMoF. Traditional mediation analyses are regression-related and usually use the three-variable model. Researchers compare direct and indirect impacts by comparing a' times b' (direct effects from predictor towards mediator and

from mediator to dependent variable) and c' (direct effect from predictor to dependent variable; Hayes, 2017). A path model allows researchers to study multiple mediation effects within a unified model, which calculates comprehensive relationships between a set of predictors toward both mediator and dependent variable (Acock, 2013). The path analysis entailed predictors in both regression models that implied mediation effects. The standardized beta weights and statistical significance were both used to locate potential mediation relationship. Figure 3.1 shows the hypothesized path model according to literature and regression analyses. The model had a great goodness fit, Akaike's information criterion (AIC) = 14471.356, $\chi 2$ (5) = 3.121, p = .681 , root mean squared error of approximation (RMSEA) = 0, comparative fit index (CFI) = 1, and Tucker-Lewis index (FLI) = 1.021 Figure 3.1 shows the hypothesized path model according to literature and regression analyses. The model had a great goodness fit, Akaike's information criterion (AIC) = 14471.356, $\chi 2$ (5) = 3.121, p = .681, root mean squared error of approximation (RMSEA) = 0, comparative fit index (CFI) = 1, and Tucker-Lewis index (FLI) = 1.021.

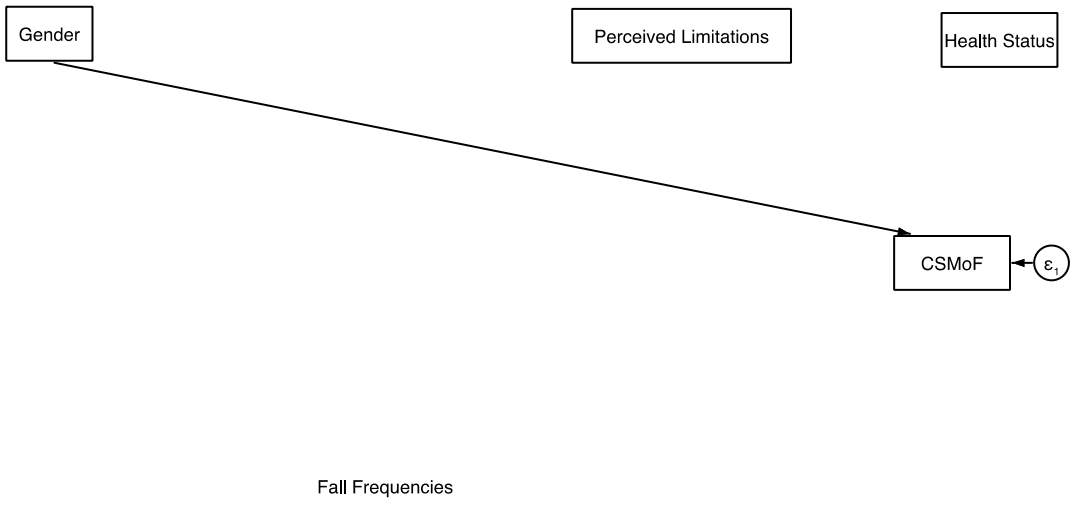

Figure 3.1: Hypothesized Path Model According to Literature and Regression Analyses

3.11 Summary and Conclusion

This chapter summarizes the research design, the sampling procedures statistical analyses, and the rationales of the selection for the analytic tools. Multiple simultaneous regressions, hierarchical regression, binary interaction analyses, and a path model were applied to the current study based upon the specific research questions asked in the beginning of the chapter. Validity and accuracy of measurements, categories of variables (i.e., dependent or independent), and preliminary analyses have been discussed.

CHAPTER 4

RESULTS

The purpose of this study was to examine a) demographic covariates, chronic conditions, and perception of falls as predictors of CSMoF, b) interaction effects between demographics and perception of falls on CSMoF, and c) the mediation role of fear of falls in predicting CSMoF. The investigator applied correlational, simultaneous, hierarchical regression, and path analyses to recognize the variance explained by predictors including demographics, chronic conditions, and perceptions related to falls.

In brief, the study found that age, gender, arthritis, diabetes, heart disease, vision limitation, health status, and perceived limitation were significantly associated with the variance in CSMoF. Fall frequencies and perceived limitations were found to be significant predictors of WHAT in binary interaction analyses. Fear of falls served as a mediator in the path model analysis that predicted CSMoF.

4.1 Correlational Analyses

CSMoF was negatively associated with age (r = -.124, p = .001), arthritis (r = -.116, p = .002), depression (r = -.082, p = .03), diabetes (r = -.134, p < .001), heart disease (r = -.107, p = .005), vision (r = -.088, p = .021), perceived limitations (r = -.259, p < .001), fall frequency (r = -.100, p = .009), and fear of falls (r = -.450, p < .001). Table 4.1 shows the correlations between CSMoF and predictors with all statistical significances noted.

Table 4.1: Correlations between CSMoF and Predictors

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
CSMoF																		
Age	-.124**																	
Living Alone	-0.051	.148**																
Gender	.077*	.190**	-.243**															
Hispanic	0.023	-0.068	0.067	-0.023														
Ethnicity	-0.032	0.058	0.068	-0.018	0.036													
Education	0.059	-.125**	-.090*	.139**	-0.01	-0.05												
Marital Status	-0.063	0.05	.429**	-.144**	0.027	0.068	-0.046											
Household	0.064	-.089*	-.457**	0.068	-0.06	-.082*	0.002	-.191**										
Arthritis	-.116**	-0.004	0.037	-.168**	-0.053	0.034	-0.055	0.065	0.027									
Breathing	-0.059	0.017	.079*	-0.004	-0.036	0.07	-.095*	0.057	-0.016	.077*								
Depress	-.082*	-0.071	.091*	-.107**	-0.057	0.032	-0.061	0.059	-0.059	.185**	0.041							
Diabetes	-.134**	-0.058	-0.02	.083*	0.006	-0.049	0.045	0.003	.083*	0.057	0.019	0.06						
Heart disease	-.107**	.153**	0.007	.137**	-0.066	0.007	-0.042	.083*	-0.014	0.07	.247**	.087*	0.049					
Vision	-.088*	.120**	-0.031	0.064	-0.011	0.033	0.012	-.080*	0.038	0.051	-0.004	0.047	-0.034	0.028				
Limitation	-.259**	.108**	0.012	0.054	-0.065	0.042	-0.063	-0.007	0.029	.263**	0.056	.112**	.088*	.163**	.107**			
Fall Frequency	-.100**	0.012	-0.022	.139**	0.064	0.048	0.009	-0.024	0.023	0.031	0.025	.161**	.079*	.171**	-0.017	.165**		
Resulted in Injury	-0.061	-0.043	-0.015	0.003	-0.012	0.035	0.056	0.019	0.01	0.062	0.014	.158**	.080*	0.07	0.009	.097*	.506**	
Fear of Fall	-.450**	-0.001	0.03	-.171**	-0.05	-0.001	0.031	-0.003	-0.042	.103**	0.028	.111**	0.031	.081*	-0.024	.236**	.080*	.136**

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

4.2 Descriptive Statistics

As shown in Table 4.2, nearly half *(n* =359, 52%) of participants reported having arthritis conditions, 94 (13.6%) reported having breathing issues, 80 (11.6%) were diagnosed with depressive symptoms, 113 (16.4%) reported diabetic conditions, 163 (23.6%) had heart diseases, and 98 (14.2%) claimed vision limitations.

Participants showed the least confidence in self-protection, as shown in "I can protect myself while falling" (*M* = 2.32, *SD* = 0.88), followed by "I can get up when I fall" (*M* = 2, *SD* = 0.95), "I can reduce falls" (*M* = 2.81, *SD* = 0.85), and "I can improve my steady" (*M* = 2.95, *SD* = 0.82), and presented the most confidence in "I can increase my strength to prevent falls" (*M* = 3.10, *SD* = 0.82). The total score of CSMoF ranged from 5 to 20 (*M* = 13.99, *SD* = 3.37$^{)\cdot}$ The 25th, 50^{th,} and 75th percentiles were 12, 14, and 16, respectively.

About 30% of participants reported at least one fall during the past three months. The number of falls ranged from 1 to 20, with a mode of 1 and a median of 4. Twelve percent of the participants had injuries because of falls in the past three months, with a mode of 1 and a median of 3. Only 9.4% of the participants reported having *no fear of falls*. Approximately 30% of participants reported having *a little* fear of falls, 43% of *somewhat*, and 17.4% of *a lot*.

Table 4.2: Descriptive Statistics for Measured Variables

Characteristics		*n* (*%*)	*M* (*SD*)
Chronic conditions			
Arthritis	Yes	359(52)	
	No	332(48)	
Breathing	Yes	94(13.6)	
	No	597(86.4)	
Depression	Yes	80(11.6)	
	No	611(88.4)	

(table continues)

Characteristics		*n* (%)	*M* (*SD*)
Diabetes	Yes	113(16.4)	
	No	578(83.6)	
Heart disease	Yes	163(23.6)	
	No	528(76.4)	
Vision limitations	Yes	98(14.2)	
	No	593(85.8)	
Perception of Falls			
Limitation	Yes	212(30.7)	
	No	479(69.3)	
Fall frequency			0.51(1.22)
Resulted in injury			0.16(0.58)
Fear of falls			2.86(0.87)
Health status			3.34(0.80)
	Poor	1(0.001)	
	Fair	88(12.8)	
	Good	326(47.2)	
	Very good	226(32.7)	
	Excellent	50(7.2)	

4.3 Simultaneous Regression Analyses

Simultaneous regression is informative for equalizing the probability of predictors to be retained in the final equation while other variables are statistically controlled (Hoyt et al., 2008). The results of these analyses include: the standardized coefficients (β) for the predictor variables, *t* values for variables, and the R^2 in each analysis, and are presented in the tables in each of the following sections.

4.3.1 Demographic Variables

The model to predict CSMoF from demographic variables was statistically significant, $R = 0.178$, $R^2 = 0.032$, $F = 2.777$, $p = 0.005$ ($f^2 = 0.031$, small effect size). Among the predictor

variables, age (β = −0.136, t = −3.410, p = 0.001) and gender (β = 0.098, t = 2.414, p = 0.016) were statistically significantly associated with the CSMoF. The model indicated that when holding other demographics constant, every ten years of increase in age lowers the CSMoF by 0.71 and that males were more likely to have a higher level of CSMoF by 0.77 points when controlling for other variables. Table 4.3 summarizes the outcome of the simultaneous regression model on CSMoF with demographics.

Table 4.3: Outcome of Demographics Regressions for Predictor Selection (*N* = 691)

	R^2	*B*	*SE B*	β
Demographic variables	0.032 *			
Age		−0.071	0.021	−0.136 *
Living alone		0.292	0.342	0.041
Gender		0.773	0.320	0.098*
Hispanic		0.398	0.825	0.018
Ethnicity		−0.088	0.204	−0.016
Education		0.138	0.182	0.029
Marital status		−0.139	0.125	−0.046
Persons in household		0.225	0.169	0.057

Note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

4.3.2 Chronic Conditions

The model to predict CSMoF from chronic health condition was statistically significant with R = 0.220, R^2 = 0.048, F = 5.808, $p < 0.001$ (f^2 = 0.053, small effect size). Self−reporting with arthritis (β = −0.089, t = −2.323, p = 0.020), diabetes (β = −0.124, t = −3.316, p = 0.001), heart disease (β = −0.081, t = −2.103, p = 0.036), and vision limitations (β = −0.083, t = −2.223, p = 0.02) were significantly associated with lower CSMoF. Overall, older adults without chronic health conditions reported higher CSMoF levels than those with chronic health conditions. For

older adults with at least one chronic condition, the CSMoF would be lower. Table 4.4 details the outcome of the simultaneous regression model on CSMoF with Chronic condition variables.

Table 4.4: Outcome of Chronic Conditions Regressions for Predictor Selection (*N* = 691)

	R^2	*B*	*SE B*	β
Chronic conditions	0.049 **			
Arthritis		−0.597	0.257	−0.089 *
Breathing		−0.28	0.379	−0.028
Depression		−0.489	0.401	−0.046
Diabetes		−1.131	0.341	−0.124 **
Heart disease		−0.645	0.307	−0.081 *
Vision		−0.803	0.361	−0.083 *

Note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

4.4 Perception of Falls, Physical Limitations, Health Status, Fear of Falls and CSMoF

This model accounted for statistically significant differences in predicting the CSMoF, $R = 0.383$, $R^2 = 0.147$, $F = 29.433$, $p < 0.001$ ($f^2 = 0.172$, medium effect size). Perceived limitation ($\beta = -0.114$, $t = -3.259$, $p = 0.001$), and health status ($\beta = 0.198$, $t = 5.554$, $p < 0.001$) significantly predicted CSMoF.

Table 4.5: Outcome of Perception of Fall Regressions for Predictor Selection (*N* = 691)

	R^2	*B*	*SE B*	β
Perception of falls	0.147 ***			
Health Status		1.227	0.157	0.290***
Limitation		-1.260	0.271	-0.173***
Fall Frequency		-0.045	0.115	-0.016
Resulted in Injury		-0.099	0.238	-0.017

Note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Those who self-perceived with physical limitations had lower CSMoF scores, whereas those that reported higher overall health status also had a higher level of the CSMoF. Each increment in perceived limitation could lead to a decrease in CSMoF by .114 standardized deviations.

Similarly, an improvement score in health status predicts CSMoF increase by .198 standardized deviations. Table 4.5 summarizes the outcome of the simultaneous regression model on CSMoF with variables regarding older adults' perception of falls.

4.5 Final Model

The final simultaneous regression analysis applied the statistically significant predictor variables in the three individual regressions to determine the magnitude of contributions of each predictor variable to the CSMoF. The predictor variables for the final model were: (a) age; (b) gender; (c) arthritis; (d) diabetes; (e) heart diseases; (f) vision limitation; (g) overall health status; and (h) perceived limitations due to falls. The final model was statistically significant, $R = 0.418$, $R^2 = 0.175$, $F = 18.08$, $p < 0.001$, indicating that about 18% of the variance in the CSMoF could be explained by the variance in the predictors in the model ($f^2 = 0.212$, medium effect size).

Table 4.6: Outcome of the Final Prediction Model (*N*=691)

	R^2	*B*	*SE B*	β
Demographics	.175***			
Age		-0.055	0.019	-0.106**
Gender		1.030	0.289	0.130***
Chronic Conditions				
Arthritis		-0.035	0.249	-0.005
Diabetes		-0.697	0.328	-0.077*
Heart Disease		-0.154	0.288	-0.019
Vision		-0.528	0.341	-0.055
Perception of Falls				
Health Status		1.145	0.160	0.270***
Limitations		-1.175	0.276	-0.161***

Note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Among all the predictors, age (β = −0.106, $t = -2.921$, $p = 0.004$), gender (β = 0.130, $t = 3.573$, $p < 0.001$), diabetes (β = −0.077, $t = -2.132$, $p = 0.034$), overall health status (β = 0.270, *t*

= 7.161, $p < 0.001$), and limitations ($\beta = -0.161$, $t = -4.263$, $p < 0.001$) were still statistically significant. However, arthritis ($\beta = -.005$, $t = -0.141$, $p = 0.889$), heart disease ($\beta = -0.019$, $t = -0.533$, $p = 0.594$), and vision ($\beta = -0.055$, $t = -1.554$, $p = 0.122$) were no longer statistically significant. Table 4.6 depicts the summary of the final model coefficients. Hypothesis 1 was supported that demographic characteristics such as age and gender predict the differences in CSMoF.

4.6 Hierarchical Regression Analysis

To understand the unique contribution of fear of falls, the predictive model was re-estimated with the hierarchical regression approach based upon the above final model. The final model was entered all together at step 1. Fear of falls was introduced into the hierarchical regression at step 2 after all other predictor variables tested.

Fear of falls was statistically significant and predicted a substantial lower level of CSMoF, $\beta = -0.362$, $t = -10.26$, $p < 0.001$.The final model with fear of falls yielded an R^2 of .286, indicating that about 29 percent of the variance in CSMoF could be explained by the model with the predictor fear of falls ($f^2 = 0.375$, large effect size). Adjusted R^2s increased from .165 to .276, suggesting that the newly added predictor, fear of falls, actually increased the predictions based on the final model. The outcome resulted in a statistically significant R^2 change ($\Delta R^2 = 0.111$, $p < 0.001$), demonstrating that while controlling all other predictor variables, fear of falls had the most unique contribution to the CSMoF. Table 4.7 shows the outcome of the hierarchical regression analysis. The second hypothesis on functioning impairment having a negative impact on CSMoF was supported.

Table 4.7: Outcome of Hierarchical Regression Analyses

	R^2	*Adj.* R^2	ΔR^2	At Entry Model			Final Model		
				B	*SE B*	β	*B*	*SE B*	β
Step 1		.165***	.175 ***						
Demographics									
Age				-0.055	0.019	-0.106**	-0.056	0.018	-0.107**
Gender				1.030	0.289	0.130***	0.478	0.274	0.06
Chronic Conditions									
Arthritis				-0.035	0.249	-0.005	-0.066	0.232	-0.01
Diabetes				-0.700	0.328	-0.077*	-0.797	0.306	-0.087**
Heart Disease				-0.154	0.288	-0.019	-0.077	0.269	-0.01
Vision				-0.528	0.341	-0.055	-0.682	0.318	-0.071*
Perception of Falls									
Limitation				-1.175	0.276	-0.161***	-0.702	0.261	-0.096**
Health Status				1.145	0.160	0.270***	0.743	0.154	0.175***
Step 2	.286***	.276***	.111***						
Fear of Falls							-1.404	0.137	-0.362***

Note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

4.7 Interaction Effects

The investigator further analyzed the interaction effects of gender, chronic conditions, fall frequency, health status, and perceived limitation on CSMoF. Table 4.8 shows the results for the interaction factors for the significant variables from the final model analysis (as reported above).

Table 4.8: Results from Interaction Analyses

Variable Interacted with Fear of Falls in Prediction of CSMoF	β
Gender	−0.176
No chronic condition	−0.019
fall frequency	0.454 ***
Health status	−0.108
Perceived limitation	0.322 ***

Note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The interaction term between fear of falls and gender on predicting CSMoF showed non−significant interactive effect, $F(3687) = -0.176$, $p = 0.078$. Similarly, the interaction term between fear of falls and whether or not a participant had chronic conditions was not a significant predictor of CSMoF, $F(3687) = -0.019$, $p = 0.854$; neither was the interaction term between fear of falls and health status a significant predictor of CSMoF, $F(3687) = -0.108$, $p = 0.414$.

Figure 4.1 presents the results of the analysis for the interaction term effect between fall frequency and fear of falls on CSMoF, which was statistically significant, $F(3687) = 0.454$, $p = 0.001$. Both fall frequency and fear of falls negatively predicted the level of CSMoF. This inverse relationship was particularly true among older adults who self−reported with a history of

up to two times of falls and who also reported a fear of falls lower than two out of four points (see Figure 4.1 for a visual representation of the interactional relationship).

Similarly, the interaction term between perceived functional limitation and fear of falls predicted levels of CSMoF, $F(3687) = 0.322$, $p = 0.009$ (see Figure 4.2 for visual representation of the interactional relationship). This means that older adults who self-perceived they had no functional limitations and had lower levels of fear of falls reported a higher level of CSMoF compared to those who self-perceived they had functional limitations. When the fear of falls increases, the level of CSMoF decreases more drastically among older adults who self-perceived they had limitations due to falls, compared to those who did not self-perceive the same thing.

Figure 4.3 summaries the conceptual model of the regression outcome that demonstrates the relationship between confidence in self-management of falls (CSMoF) and its predictors included in the final model with fear of falls.

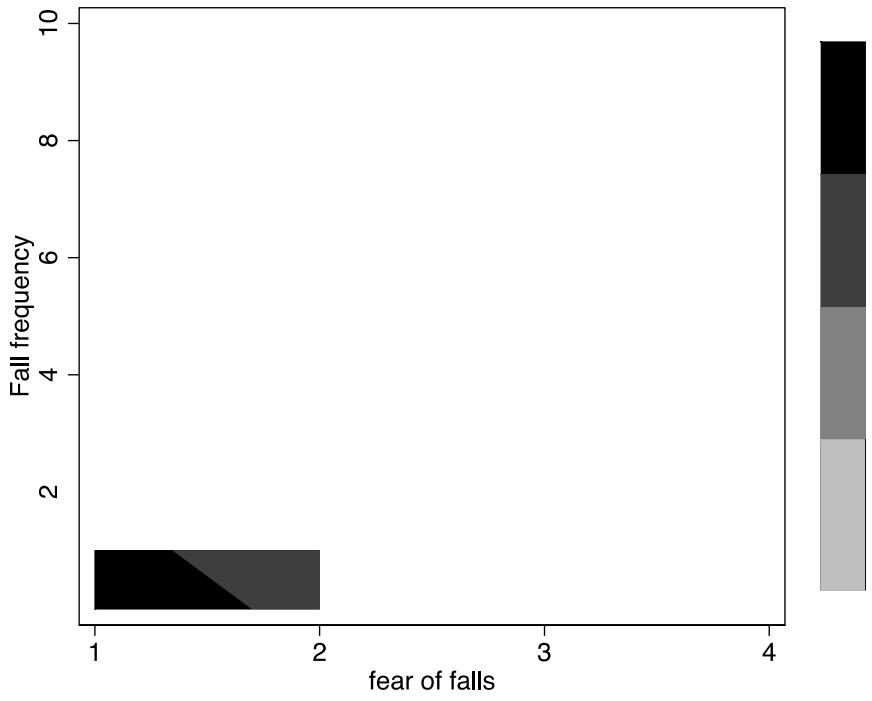

Figure 4.1: The Interaction Effect between Fall Frequency and Fear of Falls. Note. The darker shaded areas stand for higher levels of CSMoF and lighter areas for lower levels of CSMoF.

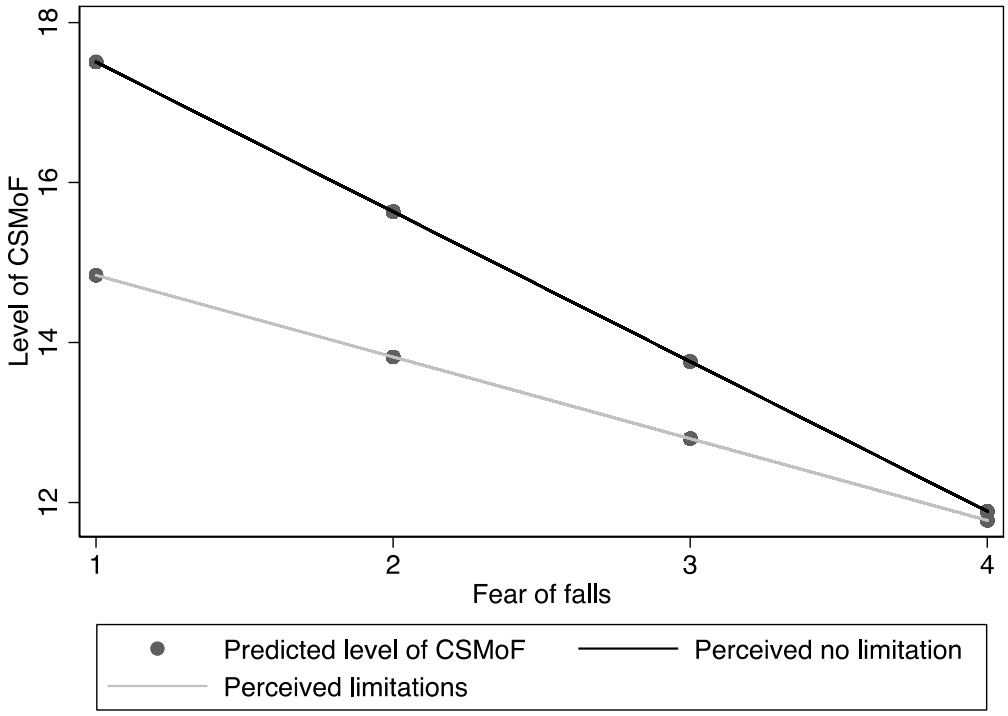

Figure 4.2: The Interaction Effect of Perceived Limitation with Fear of Falls

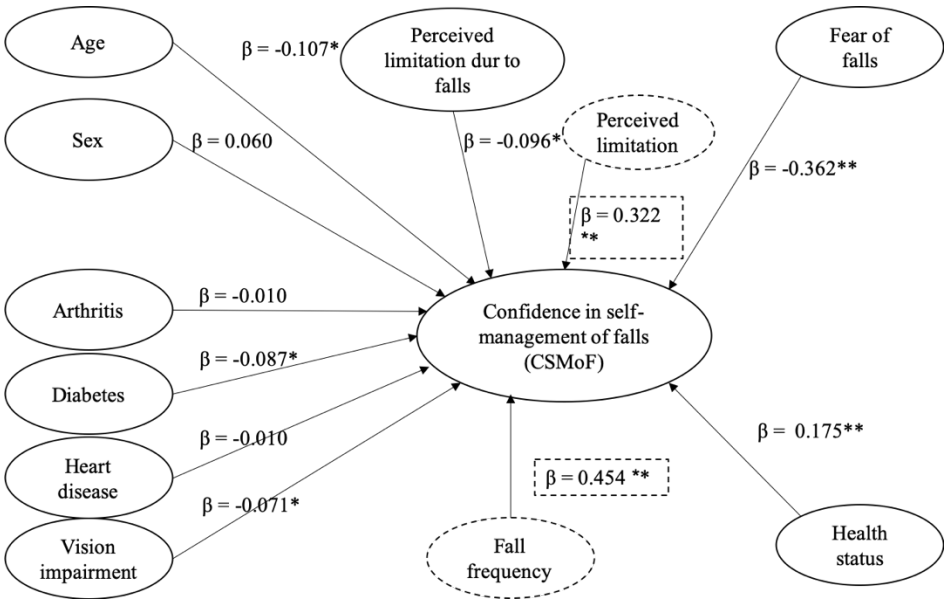

Figure 4.3: Conceptual Model of the Regression Outcome. *Note*. Dashed-line circles and boxes refer to interaction variables. * p < 0.05, ** p < 0.01.

4.8 Path Analysis

As mentioned previously, the remaining statistically significant predictors all had shrunken standardized beta weights. The changes in beta weights indicated medication effects through the newly added variable, which is fear of falls (Hayes, 2017).

After inspecting the estimation of the hypothesized path model and removing non-significant paths, the final model was re-estimated using maximum likelihood with missing values method. Figure 4.4 shows the final model of the path analysis. Table 4.9 shows the direct, indirect, total effects, and bootstrap standard errors. The final path model included fear of falls and CSMoF as endogenous variables, and gender perceived limitations due to falls, health status, and age, injuries from falls, diabetes, heart disease, arthritis, and vision as exogenous variables. All the variables were observed variables. The final model estimation yielded a good model fit, $\chi 2(5) = 3.121$, $p = .681$, RMSEA = 0 [0.000, 0.041], CFI = 1, TLI = 1.021, AIC = 14471.356, BIC = 14553.042, and SRMR = .007.

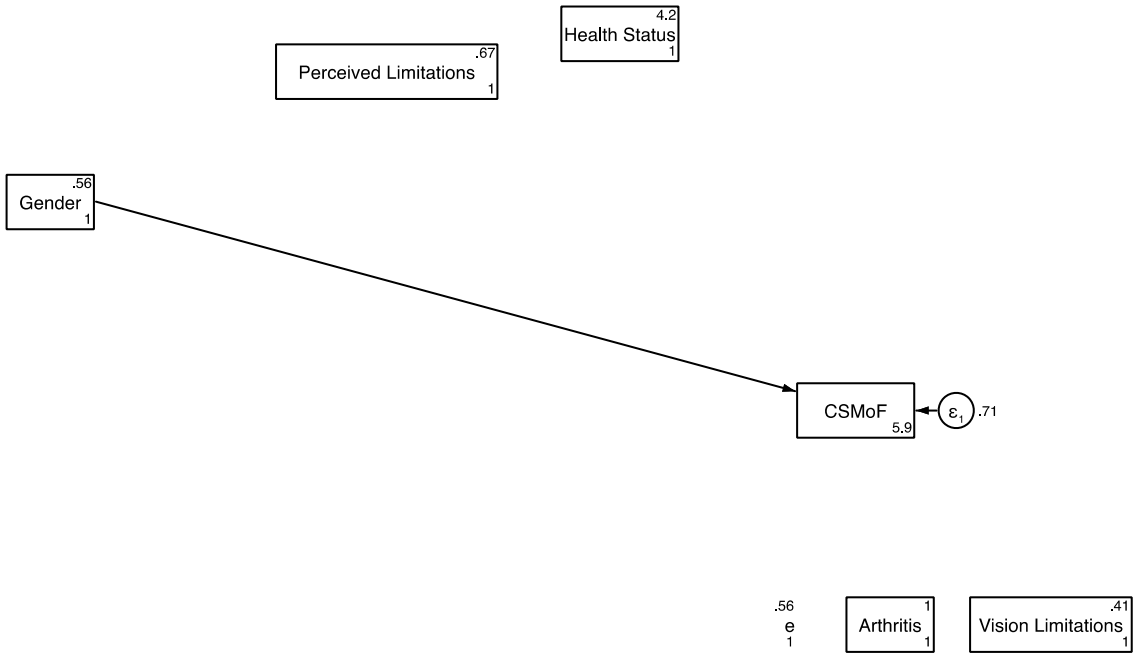

Figure 4.4: Outcome of Path Model Estimation.

Table 4.9: Observed Coefficients, Standardized Estimates, and Bootstrap Standard Errors for the Final Path Analysis Model

Variables	Direct			Indirect			Total		
	Coef.	Bootstrap SE B	β	Coef.	Bootstrap SE B	β	Coef.	Bootstrap SE B	β
Fear of falls									
Gender	-.391	.071	-.193***				-.391	.071	-.193***
Perceived limitations	.309	.069	.165***				.309	.069	.165***
Health status	-.277	.040	-.254***				-.277	.040	-.254***
Injuries	.156	.053	.104**				.156	.053	.104**
CSMoF									
Fear of falls	-.282	.027	-.363***				-.282	.027	-.363***
Gender	.095	.054	.060	.111	.023	.069***	.206	.057	.129***
Perceived limitations	-.141	.052	-.097**	-.087	.021	-.060***	-.229	.054	-.156***
Health status	.148	.031	.175***	.078	.014	.092***	.227	.031	.267***
Age	-.011	.004	-.107**				-.011	.004	-.107**
Injuries	.016	.038	.014	-.044	.015	-.037**	-.028	.041	-.024
Diabetes	-.161	.061	-.088**				-.161	.061	-.088**
Heart diseases	-.017	.053	-.010				-.017	.053	-.010
Arthritis	-.014	.046	-.010				-.014	.046	-.010
Vision	-.134	.063	-.071*				-.134	.063	-.071*

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

The equation-level goodness of fit was acceptable. The R^2s were .16 and .29 for equations of fear of falls and CSMoF, respectively. Among paths toward fear of falls, gender (β = -.19, z = -5.52, p < .001) and health status (β = -.25, z = -7.00, p < .001) predicted lower level of empathy. Limitations (β = .31, z = 4.52, p < .001) and injuries (β = .10, z = 2.97, p = .003) positively contribute to higher levels of fear of falls. Of the paths toward CSMoF, fear of falls (β = -.36, z = -10.32, p < .001), limitations (β = -.10, z = -2.72, p = .006), age (β = -.11, z = -3.17, p = .002), injuries (β = -.01, z = 0.42, p = .676), diabetes (β = -.01, z = -2.65, p = .008), heart disease (β = -.01, z = -0.31, p = .757), arthritis (β = -.01, z = -0.30, p = .766), and vision (β = -.07, z = -2.17, p = .030) predicted a lower level of CSMoF. Being a male (gender; β = .06, z = 1.74, p = .081) and having a better health status (β = .18, z = 4.86, p < .001), were reported to predict higher levels of CSMoF.

4.9 Fear of Falls and Fall History Moderate CSMoF in Fall Prevention Program

Conventionally, the non-significant c' path should be removed from the mediation analysis. We kept it and examined the indirect and total effect (Rucker, Preacher, Tormala, & Petty, 2011) as we aimed to explore the possible mediating role of fear of falls. Gender (β = .07, z = 4.87, p < .001), limitations (β = -.06, z = -4.14, p < .001), health status (β = .09, z = 5.79, p < .001), and injuries (β = -.04, z = -2.85, p = .004) all showed statistically significant indirect effects toward CSMoF. The proportions of indirect effect were 54% for gender, 38% for limitations, 33% for health status, and 74% for injuries. Fear of falls serves as a mediator through which we could better understand the working mechanism from gender, perceived limitations, health status, and injuries due to falls toward older adults' confidence in self-management of falls.

4.10 Summary and Conclusion

The investigator used correlational analyses to explore the relationship between the dependent variable (i.e., the confidence in self-management of falls) and predictors including demographics, chronic conditions, and perception of falls. The effect sizes between demographics, chronic conditions, and CSMoF were small but the effect size between perception of falls and CSMoF was medium. The effect size became large when fear of falls was included as a predicator in the hierarchical regression model and then it became a statistically significant unique predictability of CSMoF.

Simultaneous regression analyses were conducted to answer the first and the second research questions, hierarchical regression analysis was applied for the third research question, interactive analyses using regression modeling were conducted for the fourth research question, and a path model analysis analyzed the role of fear of falls for research question number five. Several major findings in the study can be summarized below:

1). Demographic variables accounted for 3% of the variance in CSMoF with a small effect size. Age and gender were statistically associated with CSMoF. Age was negatively associated with the CSMoF whereas gender positively predicted CSMoF. These finding suggested that younger subgroups of older adults, especially among younger male older adults, are more likely to have a better CSMoF. Living arrangement, ethnicity groups, education attainment, and marital status were not statistically significantly associated with CSMoF. The findings showed that demographics, especially biological factors, were associated with CSMoF - despite small effect size. Socioeconomic status and modifiable demographic variables such as education and marital status were not contributors to the variance in CSMoF.

2). The regression model with chronic conditions also statistically significantly predicted the variance in CSMoF. The model accounted for about 5% of the variance with a small effect size. Of the six measured chronic conditions, arthritis, diabetes, heart disease, and vision limitation were negatively associated with CSMoF. The results indicated that physical functioning and body structures substantially influenced older adults' self-efficacy and confidence. Having chronic conditions tended to increase the risk of having a lower level of CSMoF.

3). the regression model, whose predictors belonged to the perception of falls, explained about 18% of the variance in CSMoF with a medium effect size. Self-reported overall health status was positively associated with CSMoF, whereas perceived limitations due to falls were negatively contributing to CSMoF. The findings demonstrated that if there was a self-perception of good health, regardless of the diagnostic health, older adults are more likely to report a higher level of CSMoF. Perceived limitations because of falls, on the other hand, could lead to a lower level of CSMoF. Fall history and injuries due to falls were not statistically significant in predicting CSMoF, indicating that an older adult's previous falls may not have substantial impact on their confidence and self-efficacy in preventing falls.

4). A hierarchical regression analysis was applied to determine the additional contribution of the fear of falls in predicting CSMoF. At the first step, age, gender, arthritis, diabetes, heart disease, vision, health status, and perceived limitations were entered the model. The entry-level model accounted about 17% of the variance in CSMoF. At the second step, the variable fear of falls was entered into the model. The final model accounted for about 29% of the variance in CSMoF. Age, gender, diabetes, health status, and limitations were statistically associated with CSMoF in the first model and age, diabetes, vision, health status, and limitations were

statistically significant in the second model. While controlling for other variables, fear of falls increased the percentage of the explained variance by 11%, demonstrating that fear of falls was the strongest predictor in the current model. In addition, fear of falls also served a suppressor role as vision was not statistically significant in the first model, yet was significant in the second model once fear of falls was added into the final model. Among the significant predictors in both models, the standardized beta weights of gender, health status, and limitations changed either from significant to non-significant (i.e., gender) or from high impact to lower impact (i.e., health status and limitations), suggesting a potential mediating role of fear of falls.

5). Interactive analyses considered fall frequency and perceived limitations. Fall frequency, when interacting the fear of falls, demonstrated impact on the CSMoF. Older adults with lower levels of fear of falls tend to report lower levels of CSMoF even with the frequency of falls up to four times during the past three months. Perceived limitations also appear to have interactive effects on CSMoF as older adults who reported no perceived limitations tended to have higher levels of CSMoF compared to those who perceived they had limitations due to falls. However, as the fear of falls became more intense, the levels of CSMoF for both subgroups went to very low regardless of limitation perception.

6). The final path model explored the internal relationship between endogenous variables (i.e., fear of falls and CSMoF) and exogenous variables (i.e., gender, perceived limitations due to falls, health status, age, injuries from falls, diabetes, heart disease, arthritis, and vision limitations). The path model showed great model fits from both model and equation levels. Gender predicted a lower level of fear of falls while enhancing the CSMoF, showing that being a male tends to have higher level of CSMoF because of having less fear. Perceived limitations, similarly, increase the level of fear and thus decrease the CSMoF. Health status was also

negatively associated with fear of falls and positively with CSMoF, confirming that a better health status predicts a higher level of CSMoF by reducing the fear of falls. Although having no direct impact on the CSMoF, injuries due to falls yielded a statistically significant impact on the variance of fear of falls and led to a negative effect that predicts a lower level of CSMoF. These findings confirmed that fear of falls served as a key factor in predicting older adults' CSMoF. It also explained the statistically non-significant relationship between fall frequency and injuries and the CSMoF that fear of falls was the mid-way variable, with the two variables firstly included.

CHAPTER 5

DISCUSSION, CONCLUSION AND IMPLICATIONS

This chapter summarizes and discusses the research results, explores possible explanations for observed evidence, and explores implications of the finding of this study. It also considers limitations of the study and the generalizability of the findings as well as alternative statistical interpretations. Additionally, the chapter provides a brief discussion on implications of the study fall prevention programs for future studies on similar topics.

The goals of the study were to apply the WHO ICF model to better understand the falls risk mitigation of aging experience for older adults living in community settings addressing the following aspects: 1) the role of physical functioning and demographic factors in explaining older adults' subjective perception of falls and their confidence in self-management of falls; 2) relative contribution of subjective perception of fall risk and fear of falls in predicting confidence in self-management of falls; 3) interactive effects between demographics, chronic conditions, and personal perception of falls when predicting the confidence of self-management of falls; 4) the extent that the fear of falls and fall history moderate confidence of self-management of falls among older adults in community-based fall prevention programs.

The discussion presentation follows the order of the research questions proposed. The research questions included 1.whether the magnitude of demographics and physical functioning explains the variance in CSMoF; 2) the extent of the contribution of subjective perception of fall risk and fear of falls in predicting CSMoF; 3) the interaction between predictors when predicting CSMoF; and 4) the role that fear of falls plays in comprehensive prediction model of CSMoF.

5.1 Demographic Characteristics Influences on CSMoF.

5.1.1 Age

Participants' age was found to negatively contribute to the overall confidence in self-management of falls, indicating that the increasing of age poses increasing challenges in building CSMoF. A possible rationale for this finding is that the level of function tends to decline, and health conditions become more complicated as people age. For example, a study reported changes of body structures in bones and joints over time among older adults (Gazibara et al., 2017). In brief, older adults of different ages may not acquire the same level of confidence through a universal set of interventions as was expected. A previous cohort study argued that different age cohorts usually have different behaviors and reactions. Baby boomers, for instance, are reported more likely to change their pattern of participation in physical activities compared to other age cohorts (Swan, Brooks, Amini, Moore, & Turner, 2018). To the best of our knowledge, however, not many fall prevention programs are age sensitive. The older adult programs that include fall preventions assumed no differences across older adults age 65 and over, viewing them as a homogeneity group. Designers in programs aiming to improve the CSMoF should now include age factors. The programs could adopt customized sessions and timeframes that allow younger aged cohorts to finish the program at a faster pace while older cohorts could complete it in a more realistic period based on their individual physical, cognitive, and mental conditions.

5.1.2 Gender

Males, especially younger older males, are more likely to have a higher level of CSMoF, compared to their female counterparts. Previous studies found that females reported more concerns regarding falls than males (Painter et al., 2012) and that the concerns could lead to

avoidance of social interactions. These concerns can potentially keep female older adults at home and away from social interactions (Da Costa et al., 2008). Gender differences also influence the completion status of the fall prevention programs. Males reported more completion than females did despite the fact that females usually have lower levels of dynamic gait and are more likely to experience falls (Herman et al., 2009).

Briefly, female older adults are characterized as having lower levels of physical strength for gait balancing, tend to report a higher-level anxious feeling and fear of falls, and are less likely to complete fall prevention programs. To promote the benefits from fall prevention programs for female older adults, it is crucial to better understand the gender differences and adjust fall preventions programs accordingly.

Though the path analysis, the study revealed that the reason for the higher level of CSMoF among males was that males had less fear of falls. Thus, fear of falls should be the key to the successful reduction of falls and to the improvement in CSMoF.

Although living arrangement, ethnicity groups, education attainment, and marital status were not statistically significantly associated with CSMoF, it is noticeable that the non-significant variables could also influence the fall prevention outcomes by influencing older adults' completion status. For example, Smith et al. (2012) found that older adults with a high school degree or lower were more likely to stay in the fall prevention programs and had higher percentages of completion. Osho et al. (2018) provided recommendations that programs with participation adherence greater than 80% may result in more reduction of fall risks than those with lower participation adherence. For this AMOB fall prevention program, previous studies suggested that at least five out of eight sessions to be completed to get an improvement in overall fall reduction.

5.2 Functional Limitations and the CSMoF

Older adults who perceived higher physical functioning were less likely concerned about the risk of falls. This was based on their confidence in motion controlling. Arthritis, diabetes, heart disease, and vision limitation were found to be negatively associated with levels of CSMoF, particularly when a participant had diabetes and/or vision limitations.

5.2.1 Arthritis

It is well documented that arthritis increases the risk of falls for older adults (Barbour et al., 2012; Levinger, Wallman, & Hill, 2012; Stanmore et al., 2013). However, the suggestions regarding fall prevention for older adults with arthritis were focusing on gait balance (Barbour et al., 2012; Sturnieks et al., 2004), fall-related injuries (Stanmore et al., 2013), or arthritis-related pain (Jamison, Neuberger, & Miller, 2003). Jamison et al. (2003) also reported that older adults with arthritis tended to have more fear of falls. This was not confirmed in the current study in which arthritis was not a statistically significant contribution to the variance in fear of falls. This study found that having arthritis was associated with lower levels of CSMoF. Therefore, it would be proper to include information about arthritis-related pain alleviation or to provide extra attention to balance performance of older adults with arthritis.

5.2.2 Diabetes

Similar to arthritis, diabetes has been shown to be associated with a higher risk of falls (Schwartz et al., 2002). It is probable that older adults with diabetes tend to have weaker lower-limb strength and limited mobility due to vitamin D deficiency (Mayne, Stout, & Aspray, 2010; Shapses & Manson, 2011). Foot ulcers and related pain could also lead to an increased risk of falls among older adults with diabetic conditions (Wallace et al., 2002). Due to function limitations, older adults with diabetes usually perform with worse gait balance and tend to fall

more compared to those without diabetes (Awotidebe et al., 2016). Many studies have been done about the relationship between diabetes and fall risks; however, only few have shaded any light on fall efficacy and CSMoF (e.g., Hurley & Shea, 1992). This study identified that diabetic conditions negatively impact CSMoF and therefore, should be included into program instructions. For example, ill gait balancing performance is prevalent among older adults. However, this balancing issue may have various origins and impacts on both physiological and psychological aspects (e.g., CSMoF).

5.2.3 Heart Disease

Not surprisingly, heart disease related to a lower level of CSMoF because heart diseases influence older adults' exercise efficacy (LaPier, Cleary, & Kidd, 1992). However, heart diseases' role in fall prevention programs largely missing in fall-related studies.

5.2.4 Vision Limitations.

Vision limitations also strongly impeded the development of CSMoF due to deteriorating older adults' eye functions including contrast sensitivity, depth perception, visual field, and visual motion perception (Saftari and Kwon, 2018).

5.2.5 Chronic Conditions in General.

Without proper ways to handling negative impacts brought on by chronic conditions, older adults who know the risk factors well may still be afraid of performing certain activities. Due to the complexity of chronic conditions and the polypharmaceutical effects thereof, fall prevention programs with CSMoF development need to increase the knowledge of reducing fall risks brought on by common chronic diseases. Programs could provide knowledge and information regarding supplementation of vitamin D in the daily diet, postural control exercises,

and education of medication interactions (Chau, Ng, Kwan, Choi, & Cheing, 2013; Mayne et al., 2010; Roman de Mettelinge et al., 2013). To assist older adults with vision limitations, programs could advocate for regularly vision checks, alternative treatment options, and coping skills for declining vision (Campbell, Sanderson, & Robertson, 2010). The inclusion of chronic condition considerations assists the development of CSMoF by helping older adults to recognize the fall risks posed by their unique health conditions.

5.3 Personal Perception and the CSMoF

Self-reported health status was identified as a positive predicator of CSMoF while perceived limitations due to falls was found to be negatively associated with CSMoF.

5.3.1 Health Status

This study found a positive relationship between health status and CSMoF. As mentioned above, having health conditions limits one's CSMoF. The better an older adult perceives one's health status to be, the less likely one worries about health issues such as risks of falls because of the confidence in motion controlling. It should be emphasized that the health status in this study was not objective and was not a diagnosed health status. It was a self-reported health status. Salbach et al., (2006) conducted a study, which explored balance efficacy among older adults who had a stroke in relation to perceived health status. They found a mutual association between perceived health status and balance efficacy and found that an increase in one will bring an increase in the other. That finding was in line with this study. As stated in the chronic condition section above, having health conditions was related to worse balance performance. However, older adults may also achieve a higher level of CSMoF if it is paired with better perceived/self-reported health status.

5.3.2 Perceived Limitations

A high level of perceived limitations predicted a lower level of CSMoF (Hadjistavropoulos et al., 2012; Howland et al., 1998). Older adults may be staying at home rather than being socially active only to avoid potential falls (Harding & Gardner, 2009). Programs aimed at building a higher sense of CSMoF in older adults should focus on training seniors in recognizing the feasibility of performing certain activities without falling in strategies to perform daily activities of living without falls and in fear of falls syndrome recovery in those cases when falls do happen. In addition, CSMoF is important to older adults for safety to keep from being injured due to falls. Additionally, knowing what to do when falls do happen, including whom to call for help becomes more crucial in establishing CSMoF.

One possible solution to reduce perceived limitations is to build up CSMoF because it helps older adults to identify the risks of falls, to recognize the feasibility of performing certain activities without falling, and most importantly, to help overcome the fear of falls. A good example of this would be demonstrating to older adults some strategies that would help them to perform daily activities without falls and to protect themselves in cases where falls do happen.

The living experience of aging could be different from the current reality because older adults view this experience based upon the things they perceived (Cockerham, Sharp, & Wilcox, 1983). This is particularly important because the perceived health status and limitations could be mitigated by enhanced CSMoF. Once older adults are convinced that they could perform certain activities without falls, they could prevent falls by the knowledge learned from fall prevention programs, or they could protect themselves even when they fall, then older adults may perceive a better level of confidence in controlling their own mobility safety.

The subjective, cognition-related personal perceptions of self and falls (i.e., sensations

and perceptions) explained the most variance of the level of CSMoF. This is a particularly important finding in view of the fact previous studies premised risk for falls primarily on physical fragility (Bandeen-Roche et al., 2015; Samper-Ternent, Karmarkar, Graham, Reistetter, & Ottenbacher, 2012) rather than on cognition related variables such as self-confidence and risk perception. Consideration of cognition related variables together with physical function capabilities by fall prevention programs for older adults would make for more holistic interventions, resulting in potentially fewer actual falls by the seniors.

5.4 Fear of Fall and the CSMoF

This study found that fear of falls was prevalent among older adults as over 90% of the participants reported at least some degree of fear of falls. The study also found fear of falls to significantly predict CSMoF over and above the demographic chronic condition and perception of fall variables with a large effect size, indicating that the fear of falls may hamper older adults in their in-home and community living participation (see also Bueno et al. 2019; Finlayson et al. 2009).

This study also confirmed that fear of falls significantly influences the development of CSMoF. This may be due to the intimidation of possible injuries and accidental death by unintentional falls. Furthermore, fear of falls is relatively independent and may not automatically fade away as other factors are reduced (e.g., increased strength; Maki et al., 199). This is noteworthy because older adults may still not be able to go out of their homes to be socially active or to have a higher level of participation as long as the fear of falls is intense.

The number of falls in the past three months was not statistically associated with CSMoF in the regression analysis of this study. However, this finding does not mean that fall history has no effect on the variance in CSMoF. The interaction analysis on fall history and fear of falls

showed that fall frequency alone does not reduce the level of CSMoF significantly. However, with increased fear of falls, the CSMoF shrinks. For older adults who have had less than two falls in the past three months may still have a high level of CSMoF if they have a lower level of fear of falls. Previous studies have concluded that fear of falls derived not only from personal experiences of falls but also from discussions focusing on falls and fall concerns (Jung, Lee, & Lee, 2009). Therefore, pre-screening older adults' fall history may not enough to set up a solid understanding of one's CSMoF foundation, which may then lead to an inaccurate expectation and prediction.

When interacted with perceived limitations due to falls, fear of falls also played a key role. Older adults who reported perceiving no limitations due to falls also reported a higher level of CSMoF. However, the level of CSMoF fell drastically if they failed to manage the fear of falls. When fear of falls became intense, almost all the older adults in the program reported a very low level of CSMoF - even for those who actually perceived no limitations. Again, this finding suggested that the predictive relationship between perceived limitations and the CSMoF might not be always true if fear of falls was out of control.

The path model analysis revealed the mediating role that fear of falls plays in the predictors-CSMoF relationship. Gender, perceived limitations, health status, and injuries due to falls work through fear of falls toward the CSMoF. This model provides more information to enhance the CSMoF among older adults. In previous statements, gender, perceived limitations, and health status were all significantly contributing to the variance in CSMoF, so the implications were made based on these findings and revealed that the three variables should be carefully handled if someone wants to achieve a good level of CSMoF. Because the path model revealed the working mechanism between the predictors and the CSMoF, fear of falls has

become the center regarding program improvement. Programs would be more effective if fear of falls could be reduced. Recognizing the importance of fear of falls in the CSMoF provides recommendations for program evolution and program revision as it is easier to focus on one key mediator of the CSMoF than on three separate variables. This information is valuable for fall prevention programs with limited resources and funding.

5.5 Implications for Theory, Research and Practice in Aging

It is noticeable that learning preventive strategies alone does not guarantee a successful outcome in fall prevention for older adults with low confidence. The CSMoF plays a crucial role in fall preventive interventions for the aging population (Finlayson et al., 2009), and needs further research on its development in the programs. Guided by the ICF model, this study confirmed the validity of the application of the ICF model in aging studies, identified several factors that predict the variance in CSMoF including interactive relationships among predicators within the model, and investigated the mediating role of fear of falls that revealed the working mechanism of several predictors. This section discusses the explanations of the findings and possible implications in the order of proposed hypotheses.

5.6 ICF Model and Aging Studies

The ICF model contains body structure, body functions, activities, participation, environmental and personal factors. The predictor variables in this study could also be categorized into the ICF components:

- Body structure: arthritis, diabetes, heart disease.
- Body functions: depression, vision limitations, and breathing issues.
- Activities and participation: mobility (i.e., fall frequencies) and perceived limitations.

Contextual variables included demographics, socioeconomic status, self-reported health status, fear of falls, and the CSMoF.

Each ICF component had variables that were statistically significant in predicting the outcome variable, the CSMoF, indicating the validity of using the ICF model to guide aging studies. As stated in previous chapters, aging studies have been focusing on the medical aspects, especially for studies of successful aging (Strawbridge et al., 2002). The narrow medical focus may limit the understanding on the true aging experience of older adults and of the increasing diverse aging population because the context factors were excluded from the whole picture. The ICF model guides studies by mapping out the potential internal relationship between body, functions, related activities, participation and the setting in which older adults are living in and interacting with. In addition, rehabilitation studies recognized that medical conditions do not accurately predict one's productivity and living experience (Mpofu & Oakland, 2010). With this in mind, aging studies urge a holistic model in which more variables could be included to explore the aging experience, possible interventions, and predictable outcomes. In this study, each category had variables that are significantly associated with the CSMoF, revealing correlational relationships between all the ICF components and increasing the percentage of explained variance in the outcome. Future studies are encouraged to use measurements of each ICF components according to the ICF model description. More advanced statistical analysis could be conducted to test the theoretical validity of the ICF model with specifically measured variables.

For example, studies could use structure equation modeling to test correlations between the measurements including older adults' body structure (e.g., body-mass-index, more chronic conditions, acute conditions, etc.), functions (e.g., sensory and cognitive functions), activities

and participation (walking performance, physical activities, activities of daily living [ADL] and instrumental activities of daily living [IADL], etc.), environmental factors (e.g., community facilities, amenities, infrastructures, social policies, available social resources and supports, community inclusion, and societal attitudes toward older adults living in communities), and personal factors (demographics, personal belief, coping capacities, living arrangements, and unique personal characteristics such as disabling conditions, caregiving burden, etc.).

5.7 Limitations and Suggestions for Further Research

First, this was a cross-sectional study that sampled mostly well-educated older white Americans. For that reason, findings may not generalize to the culturally diverse population of older adult Americans or those from other settings.

Second, the measurement of health status and chronic conditions were dichotomous rather than on continuous or ordinal scales, which may bias the statistical power when using multiple regression. Single item measures may misrepresent self-reporting of health status or conditions (Hamilton, White, & Cuddihy, 2012; see also Bergkvist & Rossiter, 2007).

Third, we analyzed by chronic conditions reported by the area agency on aging on their older adult clients and with the possibility that an unknown number of older adults may have been with comorbid conditions influencing their fall risk self-confidence management.

Fourth, the single items measurement instruments for this study were those in use by the agency, which limited the best data possible for the analysis. Future studies should utilize a longitudinal design and multiple-item measures with a more ethnically diverse sample of older adults for greater confidence in the findings.

Future studies are recommended to include more diverse sample population if applicable. Stratified random sampling strategy may be a good way to achieve better outcomes. Likert point

scales may be preferable for chronic conditions measurement in future studies so each condition could have an effect size that reflect the impact of the severity of chronic conditions. In addition, it is better to measure chronic conditions by medical diagnoses rather than self-report because some conditions may be hard to distinguish (e.g., depression and dementia). Last, fear of falls, as a key variable in the studies may use more than one measurement to get results that are more accurate.

5.8 Summary and Conclusions

Even with a small effect size, demographic characteristics have substantial impact on the CSMoF and on the outcome of fall prevention programs. It would be proper to better address the differences of the demographics to better serve the older populations that become more diverse at the community level. Chronic conditions and function limitations restrict older adults' balancing performance and lower the level of CSMoF. Fall prevention programs aiming to enhance the CSMoF need to review their program design to see whether the materials and contents cover necessary information regarding the coping strategy for various chronic conditions of older participants.

Fear of falls is one of the strongest predictors of CSMoF through which many other predictors are working on the variance in CSMoF. Future fall prevention programs need to pay attention to the CSMoF, especially by alleviating or minimizing fear of falls. To achieve a better level of CSMoF, fall prevention programs needs to deal with fear of falls itself and the irrational thinking resulted from it. A Matter of Balance program, for example, provides specific sessions to manage the irrational concerns about falling (session 5) and to recognize the fall risks in both home and community levels (session 7).

APPENDIX A

NCTAAA AND UNT MEMORANDUM OF AGREEMENT

Area Agency on Aging
OF NORTH CENTRAL TEXAS

a program of the North Central Texas Council of Governments

August 5, 2016

Dr. Finley Graves
Provost and Vice President for Academic Affairs
University of North Texas
1155 Union Circle #310907
Denton, TX 76203

Dear Dr. Graves:

Enclosed please find a fully executed memorandum of understanding between the North Central Texas Council of Governments and the University of North Texas for evidence-based program analysis and evaluation. We look forward to working with your colleagues on this project.

Should you have any questions, please feel free to contact me at 817-695-9193.

Sincerely,

Doni Green

Doni Green
Director of Aging Programs

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Funded in part by the Texas Department of Aging and Disability Services
www.nctcog.org

NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS
and
THE UNIVERSITY OF NORTH TEXAS
FOR ITS DEPARTMENT OF APPLIED GERONTOLOGY

MEMORANDUM OF AGREEMENT
for
EVIDENCE-BASED PROGRAM ANALYSIS AND EVALUATION

The North Central Texas Council of Governments (NCTCOG) agrees to:

- Provide de-identified registration and survey information for evidence-based programs (Chronic Disease Self Management, Diabetes Self Management, and A Matter of Balance) to the University of North Texas' Department of Applied Gerontology ("Department") representative.
- Define the parameters of analysis and evaluation in agreement with Department.
- Allow use of evidence-based program analysis and evaluation for the purposes of research and professional publication.
- Provide access to NCTCOG Arlington location for a Department representative, subject to approval and background check. Access is limited to data input of de-identified evidence-based program information.
- Provide technical assistance to Department, as requested.
- Acknowledge and include Department researchers in authorship of publications, presentations, and journal articles.

The University of North Texas agrees to:

- Collect and organize information and data from de-identified registration and survey information.
- Maintain strict confidentiality of program information provided by NCTCOG including limiting the location of information to Department offices only.
- Assure NCTCOG that access of information will be restricted to approved researchers only.
- Donate all analysis and evaluation conducted for NCTCOG.
- Allow NCTCOG final approval on all publications and journal articles derived from the data analysis and evaluation.
- Acknowledge and include NCTCOG in authorship of publications, presentations and journal articles.
- Define the parameters of analysis and evaluation in agreement with NCTCOG.

Both parties agree and confirm that their relationship does not constitute a partnership or joint venture, or have any other binding effect, but is limited to the purposes defined in this agreement only.

This agreement shall be in effect from July 1, 2016, through June 30, 2017, unless extended by mutual agreement by both parties, or unless cancelled in writing by either party.

For: NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS

Date: 8/4/16

For: UNIVERSITY OF NORTH TEXAS

Dr. Finley Graves
Provost and Vice President for Academic Affairs

6/29/2016

APPENDIX B

DEMOGRAPHIC SURVEY

A Matter of Balance
Managing Concerns About Falls

Your Name: _____ **Today's Date:** _____

Street Address: _____ **County:** _____

City: _____ **State: Texas** **Zip Code:** _____

Phone Number: _____ **Cell:** __ **Work:**___ **Home:** _____

Email: _____

Would you like to be contacted about future classes and events hosted by the Area Agency on Aging of North Central Texas? ☐ **Yes** ☐ **No**

Your Gender: Male _____ **Female** ____ **Your Date of Birth:** ____/____/_____

Your Race:

____White-Non-Hispanic
____ White-Hispanic
____ American Indian/ Alaska Native
____ Asian
____ Black or African American
____ Native Hawaiian or Pacific Islander
____ Other Race
____ Do not wish to share my race

Your Marital Status:

____ Married
____ Widowed
____ Divorced
____ Separated
____ Never Married
____ Do not wish to share my status

What is your primary language? English ____ Spanish____ Other _____
Do not wish to share _____

How many people in your household including yourself? _____
Do not wish to share _____

What type of health insurance do you currently have? Please check all that apply
Medicare ____ Medicaid ____ Veterans Benefits ____

Private Insurance ____ Other, please specify _____

I do not have any health insurance ____ Do not wish to share _____

Please indicate your monthly income bracket below.
If you are married and live with your spouse, please indicate the income that best represents your combined monthly income.

I do not wish to share my income: _____

A. Single person: _____ $ 972.50 or less per month
   Two person: _____ $1,310.83 or less per month

B. Single person: _____ $ 972.51 to 1,458.75 per month
   Two person: _____ $1,310.84 to 1966.25 per month

C. Single person: _____ $1,458.76 to 4,096 per month
   Two person: _____ $1,966.26 to 4,610 per month

D. Single person: _____ $4,097 and over per month
   Two person: _____ $4,611 and over per month

Do you have a physical or mental limitation that prevents you from doing normal daily tasks or makes it hard to live alone? Yes _____ No _____
Do not wish to share _____

What is your education level?

Less than High School ____	Some High School ____
High School ____	Some college or vocational ____
College graduate ____	Some Graduate School ____
Graduate degree ____	Do not wish to share ____

The information on this form is required by your local service provider, the Area Agency on Aging of North Central Texas and the Texas Department of Aging and Disability Services. All information provided will be kept confidential and guarded against unofficial use. Information gathered throuzgh an intake or through an assessment may be shared to effectively plan, arrange, and deliver services to meet individual needs.
Release of information has been clearly explained to me.

_____ _____

Signature of Participant Date

Name: _____

Your Emergency Contact:

Name: _____

Phone Number: _____

Relationship: _____

Your Primary Care Physician:

Name: _____

Phone Number: _____

APPENDIX C

NCTAAA PARTICIPATION FORM

OMB Control No. 0985-0039
Exp. Date 01/31/2018

NCTAAA Participant Information Form

Today's date: ____/ ____/_____
M M D D Y Y Y Y

Participant I.D. (first two letters of your first name, first two letters of your last name, last two numbers of your birth year): __ __ __ __ __ __

---

1. Did your doctor, nurse, physical therapist or other health care provider suggest that you take this program?

   O Yes O No

2. How old are you today? _____years

3. Do you live alone? O Yes O No

4. Are you: O Male or O Female?

5. Are you of Hispanic, Latino, or Spanish origin? O Yes O No

6. What is your race? **Check all that apply**.
   - O American Indian or Alaska Native
   - O Asian
   - O Black or African American
   - O Native Hawaiian or other Pacific Islander
   - O White

7. What is the highest grade or level of school that you have completed?
   - O Less than high school
   - O Some high school
   - O High school graduate or GED
   - O Some college or vocational school
   - O College graduate or higher

8. Has a health care provider ever told you that you have any of the following chronic conditions (i.e., one that has lasted for three months or more)? (**Please check all that apply**.)

☐ Arthritis or other bone/joint disease	☐ Heart disease or blood circulation problem
☐ Breathing/lung disease	☐ Glaucoma/ other chronic eye problem
☐ Depression	☐ Other chronic condition: _____
☐ Diabetes	☐ None (No chronic conditions)

Please turn this paper over and fill out the other side.

Participant Information Form (continued)

9. Are you limited in any way in any activities because of physical, mental, or emotional problems?

   O Yes O No

10. In general, would you say that your health is:

    ○ Excellent ○ Very good ○ Good ○ Fair ○ Poor

The next few questions ask about falls. By a fall, we mean when a person unintentionally comes to rest on the ground or another lower level.

11. In the past 3 months, how many times have you fallen? O none O _____times

    a. If you fell in the past 3 months, how many of these falls caused an injury? *(By an injury we mean the fall caused you to limit your regular activities for at least a day or to go see a doctor.)*

       _____number of falls causing an injury

12. How fearful are you of falling?

    ○ Not at all ○ A little ○ Somewhat ○ A lot

13. Please mark the circle that tells us how sure you are that you can do the following activities.

How sure are you that:	Very sure	Sure	Somewhat sure	Not at all sure
a. I can find a way to get up if I fall	○	○	○	○
b. I can find a way to reduce falls	○	○	○	○
c. I can protect myself if I fall	○	○	○	○
d. I can increase my physical strength	○	○	○	○
e. I can become more steady on my feet	○	○	○	○

14. During the last 4 weeks, to what extent has your concern about falling interfered with your normal social activities with family, friends, neighbors or groups?

    ○ Extremely ○ Quite a bit ○ Moderately ○ Slightly ○ Not at all

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