EVALUATION OF A FALL PREVENTION PROGRAM FOR OLDER ADULTS IN AFFORDABLE HOUSING COMMUNITIES

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by

Erica Marie Plumb

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by

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Graduate Education

Abstract

of

EVALUATION OF A FALL PREVENTION PROGRAM FOR OLDER ADULTS IN AFFORDABLE HOUSING COMMUNITIES

by

Erica Marie Plumb

Falls present significant health, psychological, financial, and environmental burdens for older adults, society and health care systems. As the number of older adults increases, the number of fall-related injuries and fatalities will also increase. Community dwelling elders, especially low-income older adults, have an increased risk of falls. Affordable housing offers safe and supportive environments, as well as a platform for service delivery. Falls are not an inevitable part of aging and can be prevented. As a result of research, there has been an increase in fall prevention education programs. Multiple studies have highlighted the effectiveness of multi-component falls prevention programs, including A Matter of Balance, at lowering fall risk and incidence among community-dwelling older adults. There has been a need for more evaluation of fall prevention programs among specific groups, such as low-income older adults. The purpose of the study was to determine if A Matter of Balance participants at three affordable housing communities demonstrated significant and sustained improvements in their levels of falls

management, physical activity, and social limitations with regard to fear of falling. Data were analyzed through surveys using a repeated-measures, single group design. Data were collected at baseline, post program, and after six months and analyzed using mean score changes and Chi-Square analysis. Results indicated that participants showed immediate improvement of the three measures, and while these measures mostly slightly decreased at the six-month follow-up, they sustained an increased level of improvement.

_____, Sponsor
Cheryl Osborne, EdD.

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Date

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CHAPTER 1

INTRODUCTION

Introduction and Background of Issue

Falls present significant health, psychological, financial, and environmental burdens for older adults, society and health care systems. Falls are the leading cause of mortality and morbidity for older adults (Sleet, Moffett, & Stevens, 2008). Increased falls are associated with older age and deteriorating physical and mental function. Community dwelling elders, especially low-income older adults, have an increased risk of falls. Lower income is associated with a higher risk of falls (Reyes-Ortiz, Al Snih, Loera, Ray, & Markides, 2004). Affordable housing offers safe and supportive environments to low-income elders, as well as a platform for service delivery (LeadingAge, 2014). Falls are preventable and fall prevention programs can effectively reduce risk of falling. The Stages of Change Theory is effective when attempting to affect behavior change and risk mitigation. This theory is also useful when structuring and implementing fall prevention programs (Sleet, Carlson Gielen, Diekman, & Ikeda, 2010).

Falls are a significant and growing health problem for older adults (Lamb, Jerstad-Stein, Hauer, & Becker, 2005). They threaten older adults' health, wellbeing, and independence and generate enormous personal and economic costs. Falls are a primary cause of mortality and morbidity among adults aged 65 and over. A fall is defined as "unexpected event in which the participant comes to rest on the ground, floor, or other lower level" (Lamb et al., 2005, p. 1619). Every year, one in three older adults fall, and the likelihood of falling increases with age. Of those who fall, 20% to 30% suffer

moderate to severe injuries that reduce mobility and independence, and increase the risk of premature death (Alexander, Rivara, & Wolf, 1992). The older adult population is expanding rapidly, increasing fall rates and straining the health care systems and society. Individuals aged 65 years and older make up the fastest growing segment of the United States population (Centers for Disease Control and Prevention, 2015). By 2020, one in six Americans will be 65 or older. In the past decade, life expectancy has increased from 75 years in 1990 to 79 years in 2009. It has been estimated that the number of person aged 65 years and older in the United States will double by 2050 (U.S. Census Bureau, 2011). As the number of older adults increases, the number of fall-related injuries and fatalities will also increase (Sleet, Moffett, & Stevens, 2008). In addition to severely affecting the physical health of older adults, falls also impact psychological health.

Falls can also have significant psychological consequences. Many older adults who fall, whether or not they sustain injuries, develop a fear of falling (Vellas, Wayne, Romero, Baumgartner, & Garry, 1997). Whether or not falls result in injury, they significantly affect quality of life. Fear of falling is common among older adults who may or may not have experienced a fall. Fear of falling can result in limited activity and social interaction, causing depression and social isolation. Consequences include decline in physical and mental performance, increased risk of falling, and progressive loss of quality of life (Scheffer et al., 2008). Fear of falling is also strongly linked with future falls (Stevens, 2003). The psychological impact of falls severely influences older adults, but the financial impact on individuals and the larger society is also significant and important to study.

Falls and fall injuries represent an enormous financial burden to individuals, society, and the health care system. Among older adults, direct medical costs were $179 million for fatal fall-related injuries and $19.3 billion for nonfatal injuries in 2000 (Stevens, Corso, Finkelstien, & Miller, 2006). In 2013, the total cost of fall injuries was $34 billion. By 2020, the total annual cost of these injuries is projected to reach $43.8 billion in current dollars (Englander, Hodson, & Terregrossa, 1996). In addition to the substantial financial impact of falls, there is also an environmental factor to falls.

The environmental impact of falls is significant for older adults. Each year, approximately 8% of adults 70 years and older will be treated in emergency departments for fall-related injuries, and a third of these patients will be hospitalized. In a review of public health impact of older adults, Stevens (2003) notes that of the individuals hospitalized, half will require long-term care, which often results in nursing home placement. Tinetti and Williams (1997) determined that among older people in the community, falls are a strong predictor of skilled-nursing facility placement. Environmental risk factors result from the interaction of the individual and the environment. These include home hazards, and between one-half and two-thirds of falls, and 60 percent of fatal falls occur in or around the home (Stevens, 2003). The home environment is linked to 35% to 40% of falls (Josephson, Febacher, & Rubenstein, 1991). Carter, Campbell, Sanson-Fisher, and Gillespie, (2000) concluded that approximately 80% of homes have at least one hazard and 39% have 5 plus hazards. The authors determined that having more than five hazards and infrequent healthcare provider visits was associated with a least one fall (Carter et al., 2000). One significant facet of

environmental factors related to falls is housing. In this study, the focus is specifically on affordable housing.

Over two million low-income older adults live in thousands of affordable housing properties all over the county. These residents often represent a vulnerable population (LeadingAge, 2014). Due to advancing age, low-income status, and other demographic characteristics, many residents cope with multiple chronic illnesses and deteriorating physical and mental functioning. This decline can impede their ability to live safely and independently in the community. These factors put residents at risk for poor health outcomes, and make it more likely that residents will use costly health and long-term care services (LeadingAge, 2014). Higher needs equate to higher costs for Medicaid and Medicare. The increasing older adult population is expected to exacerbate these challenges (Enterprise Community Partners & LeadingAge, 2011).

Falls are not an inevitable part of aging and can be prevented. As a result of research, there has been an increase in fall prevention education programs and a transition from clinical-based to community-based fall interventions. Fall prevention programs have reduced falls and fall-related injuries among high-risk populations using multi-faceted approaches including education, exercise, environmental modification, and medical review (CDC, 2015). Through education of fall risk and engagement in fall prevention programs, older adults can effectively reduce their risk for and incidence of falls. Fall prevention programs are an opportunity for older adults to engage with other older adults, learn about fall risk reduction, and realize and address their own personal beliefs and practices that increase chances of falling and lower quality of life. These programs

address the health, physical and psychological issues related to falling through interventions (Chang et al., 2014). One such program designed to address these issues is *A Matter of Balance.*

A Matter of Balance is a fall prevention program that has been widely implemented and proven effective in reducing fall risk and increasing activity among older adults (Centers for Medicare and Medicaid Services, 2009). *A Matter of Balance* program has been implemented at various Mercy Housing affordable senior sites in northern California. Affordable housing provides an accessible and effective platform for service delivery, because programs are offered at a centralized location onsite, residents have high needs, and properties have similar residency requirements. As with any program, there is a need to evaluate fall prevention programs for older adults 65 and older living in the community. The effectiveness of existing fall prevention programs among specific segments of older adults, including those living in affordable housing and who are low-income, needs careful evaluation (CDC, 2015). It is important for fall-prevention strategies to be more effectively disseminated across various subgroups (Smith et al., 2012). This dissemination of programs and fall prevention is increasingly an area of focus.

Recently, there has been an increased focus on fall prevention both nationally and in states (Sward, 2010). The Centers for Disease Control and Prevention have made fall prevention a priority. In 2007, the CDC worked with the Administration on Aging to identify community based fall prevention programs that taught older adults how to reduce fall risk through exercise and behavior change. The CDC provides funding to the

National Council on Aging, which convenes state fall prevention coalitions. These coalitions in 30 states raise awareness and promote policies that reduce falls. In 2008, Congress passed the Safety of Seniors Act. This has increased visibility of fall prevention. Through the act, the CDC received an increase from $1 million to $2 million for older adult fall prevention. The CDC supports evidence-based demonstration programs in multiple states, including California's *Moving for Better Balance* and *Stepping On* (Sward, 2010). In addition to the national focus on fall prevention, states are also involved in promoting programs and awareness for fall prevention.

State legislatures are playing an increasing role in fall prevention by establishing programs and funds to address the issue. California recognizes "aging in place" to assist seniors in finding supportive housing or improve their home to assist with living independently (Sward, 2010). State legislation has been passed to address falls and community living in California (National Conference of State Legislators, 2015). The California Health and Safety Code 125704, the California Osteoporosis Prevention and Education Act, requires the Department of Health Services to develop effective protocols for the prevention of falls and fractures and establish these protocols in community practice to improve the prevention and management of osteoporosis. The California Welfare and Institutions Code 9450 requires the development of the "aging in place" concept to be recognized and supported by the state as a means of retaining elders in their home with less injury. It requires that funding for education and making home improvements are facilitated through public and private sources. It also requires that recommendations for changes in home modification policies and information for home

modification projects and products be developed (NCSL, 2015). Legislation focused on fall prevention in California is crucial because falls are an important issue for the state.

Falls in California are a major concern. There are over 2.4 million older adults, which is the largest elderly population of any state in the United States (National Council on Aging, 2004). Californians over age 85 are the fastest growing segment of the state's population. Between 1999 and 2009, fall-related deaths among individuals 60 and over increased by 84%. About one-third of older Californians fall each year with many of the 1.3 million suffering serious injury (NCOA, 2004). In 2004, over 70,000 individuals over age 60 were hospitalized for fall-related injures, resulting in millions of dollars in hospital costs. In Sacramento County, 2,683 were hospitalized costing $39,19.28 and in Placer County, 760 were hospitalized costing $37,363.68 (Falls Prevention Center of Excellence, 2004). In California, the average medical cost of an older adult fall-related hospitalization is $30,000. For every hospitalized traffic injury to older Californians, there are 15 hospitalizations resulting from falls. More than 40% of Californians hospitalized for hip fractures never return home or live independently again and 25% will die within one year. In 2010, there were 1,700 deaths, 79,000 hospitalizations, 178,000 Emergency Department visits, and $2.065 billion in medical costs (NCOA, 2004). As the population ages, the costs and impacts of falls will increase dramatically unless this serious public health issue is effectively addressed.

Problem Statement

Falls present a significant threat to older adults and society through health, psychological, financial, and environmental impacts. In an effort to mitigate these risks,

the fall prevention program, *A Matter of Balance,* was implemented at affordable housing senior communities in northern California to reduce risk and incidence of falling for the community dwelling older adults. Evaluation of any program is critical to assess the effectiveness of that program (Stevens, Noonan, & Rubenstein, 2010). There is a need to widely disseminate fall prevention programs and to evaluate the effectiveness of these programs in real-world settings and specific groups of older adults (Stevens & Olson, 2000). This project evaluates a fall prevention program offered in a senior affordable housing setting.

Definition of Terms

Understanding the terms listed below is important when considering this thesis' development, implementation, analysis, conclusions, and recommendations.

Affordable housing for older adults is subsidized by Department of Housing and Urban Development Section 202 program and/or the Low-Income Housing Tax Credit to provide housing that is affordable for low-income older adults. Eligibility depends on income and older adult status ranging from 55 and above to 65 and above (U.S. Department of Health and Human Services, Assistant Secretary for Planning and Evaluation, Office of Disability, Aging and Long-Term Care Policy, 2014).

Community dwelling is residing in one's own home, either with or without assistance (Yang, Tomlinson, & Nagalie, 2001).

Extremely Low-Income are households with maximum income of 30% of the Area Median Income (Bates, 2015).

Fall is an unexpected event in which the participant comes to rest on the ground, floor, or other lower level (Lamb et al., 2005).

Fall-associated death, or fall-related death, is defined as a fall as the contributing cause but not the underlying cause of death (Stevens & Rudd, 2014).

Fall death occurs when a fall is the underlying cause of death (Stevens & Rudd, 2014).

Older adult is an individual aged 65 years and older.

Medicaid is a public health insurance program for low-income children and adults. States administer this program, and federal and state governments jointly finance it. Federal minimum standards for eligibility are state coverage of core groups, which include low-income elderly individuals. These core groups are subject to different minimum income levels. For older adults and people with disabilities, states typically provide coverage to those who receive Supplemental Security Income (USDHHS et al., 2014).

Medicare is a federal program that provides health insurance for older adults and people with disabilities. The program is typically an entitlement for adults who are eligible for Social Security and have made payroll tax contributions for ten or more years or are the spouse of someone who meets eligibility guidelines (USDHHS et al., 2014).

Medicare and Medicaid Enrollees (MMEs) are participants who are part of both Medicare and Medicaid. These individuals are often referred to as dual eligible or duals (USDHHS et al., 2014).

Section 202 Housing Program is a supportive housing for the elderly program. It is run by The United State's Department of Housing and Urban Development (HUD), and helps finance the development of affordable and accessible housing for low-income older

adults. Capital is provided to private nonprofit organizations and need not be repaid as long as the buildings house low-income seniors. The program also provides rent subsidies (USDHHS et al., 2014).

US Department of Housing and Urban Development (HUD)-assisted programs are housing assistance programs provided to about 4.6 million low-income households, including families with children, older adults, and people with disabilities. Tenant income eligibility is determined on the basis of AMI, adjusted for family size (USDHHS et al., 2014).

Very Low-Income are households with maximum income of 50% of the Area Median Income (Bates, 2015).

Purpose of Study

Falls present a significant threat to older adults for a variety of reasons. In an effort to mitigate these risks, *A Matter of Balance* was implemented at affordable housing senior communities to reduce risk and incidence of falling for the community dwelling older adults. Evaluation of the program is critical to assess the effectiveness of the program (Smith et al., 2012 & Stevens et al., 2010). The purpose of this study is to evaluate if the participants at the three affordable housing communities have demonstrated significant and sustained improvements in their level of falls management, level of exercise, and social limitations with regard to concern about falling.

Theoretical Rationale

The Stages of Change Theory is useful when working with individuals to adopt improved behaviors and mitigate fall risk as well as when structuring and implementing a

fall prevention program (Sleet et al., 2010). It is important to consider behavioral approach with fall prevention. Behavior change is crucial in a decrease in injuries and risk of injury (Sleet et al., 2008). The Transtheoretical Model (TTM) outlines behavior change as a dynamic instead of fixed process. TTM recognizes change as a process that unfolds over time and includes the following stages, Precontemplative, Contemplative, Preparation, Action, and Maintenance. Programs incorporating TTM results have been shown positive results, such as increased participation in the change process (Prochaska & DiClemente, 2005).

For an older adult to adopt a mitigating behavior, such as decreasing fall risk, movement from one stage to the next is necessary. By identifying what stage an individual is in, a leader may select and focus on an appropriately matched intervention (Sleet et al., 2010). Knowing that older adults may be hesitant to incorporate fall prevention strategies and that a substantial proportion are afraid of falling are important factors to incorporate when designing community fall prevention programs (Boyd & Stevens, 2009). Fall prevention programs focus on risk reduction and behavior change. Changing beliefs, attitudes, and self-efficacy are required prior to attempting changes in actual behavior.

Research Questions

1. Does participation in *A Matter of Balance* increase levels of fall management?
2. Does participation in *A Matter of Balance* increase physical activity?
3. Does participation in *A Matter of Balance* decrease social limitations with regards to fear of falling?

4. Can these gains in reducing risk of falling be maintained after program conclusion?

Assumptions

This study was based on six assumptions. These included: 1.) the participants were age 60 or older, 2.) they were ambulatory, 3.) participants were able to solve problems. 4.) They had a 6th grade reading comprehension ability, 5.) participants responded truthfully on the self-reported surveys, 6.) the participants who signed up for the *A Matter of Balance* program were a.) concerned about falls, b.) have sustained a fall in the past, c.) restrict activity because of fall concerns, or d.) were interested in improving flexibility, balance, and strength.

Limitations

Potential limitations of the study include that there were a limited numbers of program participants and therefore data were gathered and conclusions were drawn from a limited number of respondents. In addition, the survey responses were based on subjective self-reporting. Program participants may have intended to answer honestly and objectively, but the answers were subject to personal bias. Also, there were limited follow up surveys that were used in program evaluation. The survey was given out the last day of the program, and there was only one follow up survey to look at sustained results six months later. Another limitation is that program's surveys did not measure incidence of falls, so an actual decrease of falls could not be measured in this project.

Human Subjects Consideration

Prior to data collection and analysis, a 2015-2016 Human Subjects Research Application was submitted and the project received an IRB Approval (Appendix A) as exempt. The researcher explained the purpose of the study to all prospective participants. All volunteer participants were asked to read and sign the Informed Consent (Appendix B) prior to completing the follow up survey. In order to maintain confidentiality, all signed consent forms and surveys were kept in a secure location by the researcher. Confidentiality was also assured by assigning numerical codes to each participant in an Excel spreadsheet.

Significance of Study

This project seeks to contribute to the body of knowledge regarding effective fall prevention methods in elders. Falls have a severe cost to older adults, society, and healthcare systems. The significance and importance of this study are evidenced by increasing incidence of falls, deaths, injuries, fear of falling, cost of falls (Stevens, 2003 & Stevens et al., 2006). The swelling older adult population will exacerbate these issues (Sleet et al., 2008). Older adults in affordable housing communities often face deteriorating health status and few social supports, so are in particular need of fall prevention intervention. Mercy Housing implemented *A Matter of Balance* in order to address this significant problem for the older adults at its properties. The research sought to evaluate the physical and psychological interventions addressing falls for low-income elders. This was achieved through evaluating and determining the effectiveness of the program in reducing fall risk at its properties.

Conclusion

Falls is a significant and growing problem for older adults, society, and the healthcare system. They threaten older adults' health, wellbeing, and independence and generate enormous financial burden. As the number of older adults increases, the number of fall-related injuries and fatalities will also increase. Falls are not an inevitable part of aging and many can be prevented. There has been an increase in fall prevention education programs, which have been proven to be effective. Through intervention, older adults can effectively reduce falls and fall risk. Fall prevention programs, such as *A Matter of Balance*, are an opportunity for older adults to lower chances of falling and increase quality of life through adopting behavior changes (Sleet et al., 2008). There is a need to evaluate the effectiveness of fall prevention programs in real-world settings and with specific groups of older adults.

Chapter two, the literature review, explores the statistics, impact, risks, and effective interventions, including *A Matter of Balance*, of falls. The literature review supports the thesis content by outlining the need for and importance of fall prevention. It documents the older adult population increase's effect on falls and particular risk of older adults in affordable housing for falling. Chapter two also reviews the theoretical rationale for adopting behaviors that reduce fall risk, and how programs are effectively implemented to maximize results for older adults.

Chapter three, the methodology section, explains research design, population and setting, data collection, and data analysis procedures of the thesis. The process of data evaluation is also presented as well as the data collection tools.

Chapter four is the analysis of the study's data, results, and discussion. In this chapter, the findings of the study investigating falls management, physical activity, and fear of falling are discussed and presented.

Chapter five provides a summary of the entire research effort. General thesis conclusions are made as well as recommendations for further study.

CHAPTER 2

REVIEW OF LITERATURE

Introduction

Falls are a significant and growing health, psychological, financial, and environmental problem for older adults. They threaten older adults' health, wellbeing, and independence and generate enormous personal and economic costs. Falls are a primary cause of mortality and morbidity among adults aged 65 and over. A fall is defined as "unexpected event in which the participant comes to rest on the ground, floor, or other lower level" (Lamb et al., 2005, p.1619). Every year, one in three older adults fall, and the likelihood of falling increases with age. Of those who fall, 20% to 30% suffer moderate to severe injuries that reduce mobility and independence, and increase the risk of premature death (Alexander, Rivara, & Wolf, 1992). Many older adults are susceptible to this risk.

Community dwelling elders, especially low-income older adults, have an increased risk of falls. Lower income is associated with a higher risk of falls (Reyes-Ortiz, Al Snih, Loera, Ray, & Markides, 2004). Affordable housing offers safe and supportive environments to low-income elders (LeadingAge, 2014). Falls are preventable and fall prevention programs can effectively reduce risk of falling. The Stages of Change Theory is effective when attempting to affect behavior change and risk mitigation (Prochaska & DiClemente, 2005). This theory is also useful when structuring and implementing fall prevention programs (Sleet, Carlson Gielen, Diekman, & Ikeda, 2010).

The purpose of this thesis is to evaluate the effectiveness of a fall prevention program in affordable housing senior communities in Northern California. This chapter is divided into four sections. To understand the theoretical rationale behind the research, the first section provides an understanding of the theory and investigates the theory research in relation to fall prevention. In an effort to gain a broader picture of falls and their impact, the second section covers falls and the elderly. This section contains subheadings including the older adult population, health factors, psychological factors, financial factors, and environmental factors related to falls. The third section explores elders in affordable housing focusing on health status, health and housing connection, and opportunity to address falls. Lastly, the fourth section presents fall intervention programs. This section is divided into subheadings covering multicomponent interventions, key program components, impact of fall prevention programs, development of fall prevention programs, and *A Matter of Balance* program. The studies in this literature review act as an impetus to the research topic of falls prevention to support the need for program evaluation and the study findings.

Stages of Change Theory and Falls

The Stages of Change Theory is useful when working with individuals to adopt improved behaviors and mitigate fall risk as well as when structuring and implementing a fall prevention program (Sleet et al., 2010). It is important to consider a behavioral approach with fall prevention. Behavior change is crucial in a decrease in injuries and risk of injury (Sleet et al., 2008). This section provides an explanation of the Stages of Change Theory, or Transtheoretical Model and its connection to fall prevention.

Transtheoretical Model

The Stages of Change Theory, or the Transtheoretical model (TTM), was developed in the early 1980s in an attempt to understand perspectives on smoking behavior change (Prochaska & DiClemente, 1983). TTM outlines behavior change as a dynamic instead of fixed process. TTM recognizes change as a process that unfolds over time. While progression through the Stages of Change can occur linearly, a nonlinear progression is common. It is common for individuals to recycle through the stages or regress to earlier stages from later ones (DiClemente & Prochaska, 1998). The time a person can stay at each stage is variable, but the tasks necessary to move to the next stage are fixed. To facilitate progress and prevent relapse at each stage, the components of decision-making and self-efficacy are key. A program incorporating TTM results in increased participation in the change process (Prochaska & DiClemente, 2005). The stages and their components are described in the subsequent paragraph.

The Transtheoretical Model recognizes that individuals differ in their readiness to change behavior. Changes occur in discrete steps over time (Prochaska & DiClemente, 2005). There are five stages in this model. The process of change in each stage represents the types of activities experienced or initiated by an individual in modifying behaviors related to a problem. The first is the Precontemplative stage. This is defined as an individual not intending to take action in the near future, or the next six months. People in the stage are usually unaware of the negative impact of their behavior, experience fewer emotional reactions to the negative parts of the problem behavior, are more closed off with significant others about their problem, and do little to focus on overcoming their

problems. Effective consciousness-raising interventions include observations and confrontations to help the individuals become more aware of the causes and consequences as well as remedies of their problem. To move from Precontemplation to Contemplation, the person must become aware of and take ownership of the problem. As individuals become more aware of themselves and their problems, they are better able to reevaluate themselves.

The second stage is Contemplative. During this stage, an individual is aware and thinking about change in the foreseeable future, or next six months. During this time, people recognize that their behavior is problematic and take more thoughtful consideration of changing the behavior.

The third stage is Preparation. In this stage, an individual takes steps necessary for immediate change, or in the next 30 days. Preparation includes a readiness to change in the near future and evaluation of lessons learned from past change attempts and failures. Individuals in this stage are on the verge of action and need to set goals and priorities. A common strategy is to develop an action plan for how to proceed in behavior change as well as commit to follow through on these actions. Small changes toward behavior change are taken.

The fourth step is Action. In this stage, an individual makes the change for a short period of time, or less than 6 months. During this stage it is especially important that the individual acts from a place of self-liberation and self-efficacy. This is the "belief that one's own efforts play a crucial role in succeeding in the face of difficult situations" (Prochaska & DiClemente, 2005, p.151). Individuals must believe that they have the

ability to change their lives, but also need to accept that coercive forces are part of life. Individuals must also be able to deal with external factors that can pressure them to relapse. As Preparation before Action is essential, so is preparation for Maintenance.

Lastly is the Maintenance stage. This is defined as the individual successfully changing the behavior for more than 6 months and intending to continue with the behavior change. Successful maintenance is the result of each of the change processes before it. It also necessitates open evaluation of potential relapse situations. Crucial to this stage is the sense that the individual is becoming more of the person one wants to be (Prochaska & DiClemente, 2005). The Stages of Change theory requires certain actions and conditions of the individual.

The Stages of Change Theory outlines behavior change as a dynamic, non-linear process (DiClemente & Prochaska, 1998). Each stage of change represents a length of time and a series of tasks that are needed for progression to the next stage. A process of change represents activities or experiences of an individual while modifying thinking and behaviors related to a problem behavior. The length of time may vary, but the tasks to move to the next stage stay the same (Prochaska & DiClemente, 2005). It requires movement from one stage to another through decision-making and self-efficacy. Through their research, Prochaska and DiClemente (2005) determined that individual process of change is emphasized during each stage of change. Using this as a guide serves as an important resource for therapists or persons trying to instigate change to use. Lack of knowledge and understanding of the stage and where an individual is lead to the assumption that all individuals are at the same stage and readiness for change. These

interventions tailored to each stage of change allow the individual to engage in more accurate self-reflection and information processing (Prochaska & DiClemente, 2005). TTM connects to this thesis because to reduce risk of falls, older adults must modify behavior to reduce fall risk.

Stages of Change Theory and Fall Prevention

The Stages of Change Theory connects to fall prevention programs. Programs that focus on fall risk reduction require attitude and behavior change by the individual. Braun (1998) executed a study that assessed the perception of falling to determine the importance of fall-related risk factors, and to identify characteristics and attitudes associated with importance of fall risk factors. Subjects included 120 community dwelling elderly individuals from Resident Council meetings at three apartment buildings for older adults. Data collected from surveys and fall reports were analyzed using Chi-square test, analysis of variance, and linear regression. Results showed that ten percent of subjects fell in the previous month and eighty-six percent considered falling to be preventable and moderately important compared to other health concerns. The perceived personal likelihood of falling due to risk factors was markedly lower compared to perceived risk for other elderly individuals. The author concluded that many community dwelling older adults considered falls to be preventable and understood the importance of fall-related risk factors, but did not consider themselves personally susceptible (Braun, 1998). Within *A Matter of Balance*, education and recognition of personal falls risk is a key component during the program (Smith et al., 2012). Changing beliefs, attitudes, and

self-efficacy are required prior to attempting changes in actual behavior and are integrated in the Stages of Change model.

A study of the same year investigated fear of falling. Tennstedt et al. (1998) conducted a randomized, single-blind controlled study that evaluated a community group fall intervention with the goal of reducing fear of falling. The test included 434 individuals aged sixty and older from forty senior housing sites in Boston who reported fear of falling. The intervention group reported increased levels of activity and improved social function. The researchers concluded that an effective approach to educating participants about their self-conceptions regarding falling and risk of falling involved instilling adaptive beliefs such as greater perceived control, confidence in one's ability, and realistic evaluation of perceived failures. This also promoted a realistic and adaptive self-view. An initial focus on education and sharing of fears allowed older adults to learn information and facts about falls. Subsequent activity and discussion allow the participant to shift from self-defeating to motivating thinking. The approach to changing attitudes about exercise was reinforced by material regarding incidence of falls, risk of falling, skills training in fall prevention, and what to do if one falls. The benefits of physical activity in improving balance and strength in order to reduce falls as well as the negative physical and psychological consequences of declined activity were stressed. Goal setting through action planning was used for desirable changes to help personalize and individualize the intervention for each participant (Tennstedt et al., 1998). As in the Stages of Change theory, the authors of this study proved the importance of self-perception and self-confidence, which is key throughout the TTM (Prochaska &

DiClemente, 2005). Also, as in the Precontemplative stage, during *A Matter of Balance* education is emphasized as part of intervention and consciousness-raising (Smith et al., 2012). Lastly, this study included the importance of action planning and goal setting as integral in the Preparation stage, which was emphasized in the program as a method of individuals preparing for behavior change to reduce risk. Each of these focuses assists program participants to move through Stages of Change to reduce their risk of falling. The study connected to this thesis because fall prevention requires behavior change.

Behavior change is important to integrate into fall prevention efforts. Boyd and Stevens (2009) investigated falls and fears of falling related to psychological beliefs and behaviors. The study estimated the frequency of falls and prevalence of fear of falling for 1,709 adults 65 and older through phone surveys from 2001 to 2003. Results included that 9.6% of older adults fell at least once in a three-month period, and about 36.2% of all older adults stated they were moderately or very afraid of falling. Of the older adults who fell, few reported making any changes to prevent falls. The authors determined that both falls and the psychological component of fear of falling can result in adverse health outcomes, including decreased quality of life, functional limitations, and depression. Boyd and Stevens (2009) asserted that health factors such as declining physical ability and uncertainty of ability need to be considered when implementing interventions. Older adults' psychological barriers, including fear of falling and their reluctance to adopt behaviors that could prevent future falls, should be considered when designing fall prevention programs. Also, the financial impacts of poor health and poor environmental factors needed to be considered for interventions. Knowing that older adults may be

hesitant to incorporate fall prevention strategies and that a substantial proportion are afraid of falling were important factors to incorporate when designing community fall prevention programs (Boyd & Stevens, 2009). Each of the factors discussed in this study should be included in fall prevention, and are included in the three research measures of this thesis: falls management, fear of falling, and physical activity.

Change theory is integral to fall prevention. Sleet et al. (2010) discussed the application of behavior change theories in community health settings. The review emphasized theory-based approaches to behavior risk management. The authors argued that many injuries are preventable and interventions must include a behavior element. The authors concluded that to prevent injuries, such as falls, an understanding of patient knowledge, attitudes, behaviors and social norms leading to injuries need to be understood. For an older adult to adopt a mitigating behavior, movement from one stage of the Stages of Change Theory to the next was necessary. By identifying in what stage an individual is in, a leader may select and focus on an appropriately matched intervention (Sleet et al., 2010). Behavioral interventions could supplement environmental modifications to prevent falls. Although the physical and social environment played a role in encouraging or encumbering healthy behavior, individual risk-taking behaviors are powerfully shaped by environmental and personal aspects that were modifiable with prevention interventions. A decrease in injury and injury risk was extremely rare without behavior change (Sleet et al., 2010). This study aligns with the portion of TTM because it focuses on individual readiness and motivates individuals to change negative behaviors.

The Stages of Change Theory is critical to fall prevention and adopting behavior changes. The theory was considered in the development of *A Matter of Balance* program and in this study's approach to evaluation of the program. The next section of the literature review provides a thorough analysis of older adults and falls.

Older Adults and Falls

The older adult population is expanding rapidly, increasing fall rates and straining the health care systems and society. By 2020, one in six Americans will be 65 or older. In the past decade, life expectancy increased from 75 years in 1990 to 79 years in 2009. It was estimated that the number of person aged 65 years and older in the United States would double by 2050 (U.S. Census Bureau, 2011). Sleet, Moffet, and Stevens (2008) predicted that as the number of older adults increases, the number of fall-related injuries and fatalities will also increase. Falls have health, psychological, financial, and environmental risk factors, and, therefore, this increase in population will impact the health, psychological, financial, and environmental status of older adults.

Rising Population and Falls

The United States older adult population is experiencing unmatched growth. In 2010, there were 81.5 million adults aged 45- 64 years old and 40.3 million people 65 years and older (Barbour et al., 2014). The population 65 and over was 43.1 million (13.7%) in 2012 and is projected to increase to 79.7 million (21%) in 2040. The 85 and older population is projected to triple from 5.9 million to 14.1 million in 2040. Specifically in California, 12.1% of the total population is 65 and above (Administration on Aging, 2013). There were more individuals 65 years and older in 2010 than in any

previous year. Between 2000 and 2010, the population 65 years and over increased at a faster rate (15.1%) than the total U.S. population (9.7%). Between 2000 and 2010, the 85 to 94 year old group experienced the fastest growth (U.S. Census Bureau, 2014).

With the large number of adults reaching age 65 years and older, it becomes increasingly important to understand this population as well as the implications population aging has for various family, social, and economic aspects of society (U.S. Census Bureau, 2011). Most older people have at least one chronic condition and many have multiple conditions (AoA, 2013) In a review of fall and fall injuries in the United States, Barbour et al. (2014) asserted that the projected rapid growth in the older adult population demonstrated the need for increasing fall prevention efforts.

Along with the increasing older adult population, there is a sharp increase in poverty among older adults in the United States. In 2012, over 3.9 million elderly individuals, 9.1% were below the poverty line as compared to the poverty rate for older adults in 2011 of 8.7%. With a Supplemental Poverty Measure (SPM) that takes into account regional variations of living costs, non-cash benefits, and non-discretionary expenditures, the 2012 poverty level or older adults was 14.8% of the older adult population. This increase is mainly due to the inclusion of out of pocket medical expenses (AoA, 2013). The rising population and fall incidence have various impacts on older adults, including health factors.

Health Factors and Falls

Health is a significant and important factor in falls. Falls are the leading cause of injury death for adults over age 65 and are the most common cause of nonfatal injuries

and hospital admissions for traumatic injuries (Sleet et al., 2008). The physical health of older adults causes various significant risk factors for falls. These impacts place a large burden on healthcare systems because falls result in high incidence of emergency department visits, hospital admission, admissions to rehabilitation and long-term care facilities, and other needed health services (Boye et al., 2012). Numerous effective fall interventions include a focus on physical health (Chang et al., 2004). The subheadings in this section address research on the risk factors for falls, impact of falls, and interventions for falls related to health.

Health Risk Factors for Falls. A compilation of risk factors for falls was developed through a comprehensive review of literature researching falls in older adults. Older adults face various risk factors increasing the likelihood of a fall. Most falls result from the interaction of multiple risk factors. The likelihood of a fall increases with the increasing number of risk factors present. In a study assessing risk factors for falls among community dwelling elderly, Tinetti, Speechly, and Ginter (1988) conducted a one-year investigation sampling 336 adults 75 years of age and older to identify falls and their circumstances. The report concluded that proportion of older people who fell in one year increased from 19% for those with one risk factor to 32% for those with two risk factors, to 60% for three risk factors, and to 78% for four or more risk factors (Tinetti et al., 1988). The literature review research categorized risk factors into four dimensions: health, psychological, financial, and environmental factors. *A Matter of Balance* sought to address each of these risk factors for program participants; these are evaluated in this

study. Health risk factors will be discussed in the next section focusing on the physical aspects.

Physical. Biological factors pertain to the human body. For example, age, gender, and race are non-modifiable risk factors. They also include age-related changes such as decline of physical function. The literature review demonstrated that many of the earlier identified risk factors are still present today.

Braun (1998) executed a study to identify personal characteristics and attitudes associated with perceived importance of fall-related risk factors among community dwelling elders. Braun assessed fall factors of 120 individuals at three older adult apartment buildings through a self-administered survey and evaluated the data using chi-square test, analysis of variance, and linear regression. He determined that among community-dwelling elders, the risk of falling is three to four times higher among people with muscle weakness or gait or balance disorders (Braun, 1998). Some of these risk factors may also be connected or enhanced by various medications taken by elders.

Leipzig, Cumming, and Tinetti (1999) evaluated the evidence linking psychotropic drugs with falls in older adults through fixed-effects meta-analysis. The survey utilized forty studies for a systematic evaluation of drug use with falling in people over age sixty. The authors concluded that many older adults use psychoactive medications, especially benzodiazepines, antidepressants, and sedatives/ hypnotics, which all increase the risk of falling. It was determined that there is an association between use of most types of psychotropic drugs and falls (Leipzig et al., 1999). This

evidence was based on observational data. Further studies that are larger randomized controlled trials should measure falls as an adverse outcome.

Similar to the findings of Leipzig et al. (1999), Stevens (2005), in a report of the latest research findings on falls for the Journal of Safety Research and Centers for Disease Control and Prevention, outlined physical function factors increasing fall risk. The author identified leg weakness, problems with balance and gait, lower-body strength, mobility, and visual impairment as risk factors increasing the chance of a fall (Stevens, 2005). When assessing risk factors of falls, Stevens (2005) noted that the interaction of biological factors with other risk factors increases the chance of falling.

In another review examining epidemiology, risk factors, and prevention strategies for falls, Rubenstein (2006) noted that weakness, unsteady gate, confusion, and certain medications are identified risk factors. He noted that most falls were associated with one or more risk factors. The author reported that older people have stiffer, less coordinated, and more dangerous gaits than younger people. An individual's posture control, muscle strength, and stepping height all decline with age and impair the ability to prevent a fall after a trip or slip. The author also specified age-related impairments of vision, hearing and memory as contributors to the number of trips and slips resulting in falls (Rubenstein, 2006). Another common reported cause of falls in this study is dizziness. Dizziness can stem from a variety of sources. These include cardiovascular disorders, hyperventilation, orthostatic hypotension, alcohol intake, drug side effects, anxiety, or depression (Rubenstein, 2006). Postural hypotension is also a cause of falls through dizziness. Blood pressure may drop when an older adult gets up from lying down or sitting, which can

increase the chance of falling. Postural hypotension may result from dehydration or certain medications. Some individuals may feel dizzy, but others may not notice (Rubenstein, 2006). Most of the health risk factors discussed in this section, such as blood pressure, medication, and leg weakness, were included in education and intervention in *A Matter of Balance* to assist participants with the Contemplation stage of behavior change through the TTM model.

Health Impact of Falls. Research consistently recognized the severe impact of falls on various aspects of health, including death, injury, hospitalization, psychological impact, and cost. In a comprehensive literature-based overview of the impact of falls on the elderly, Boye et al. (2012) concluded that falls affect a large percentage of older adults and had a significant impact including high morbidity and mortality rates, injury, fear of falling, social isolation, loss of physical function, poor quality of life, and reduced independence.

Death. In a review of the public health impact and prevention strategies for falls among older adults, Stevens (2003) noted that from 1989 to 1999, the number of people 65 and older in the United States increased 13 percent, from 30.7 million to 34.8 million, while the number of fatal falls increased 57 percent, from 6,428 to 10,097. In addition to the increase in the absolute number of fall deaths, fall death rates increased 40% overall (Stevens, 2003).

In the past decade, death rates for both men and women have increased severely. Sleet et al. (2008) conducted a literature review of fall prevention progress from 1985 to 2005, including a focus on how the number of falls in the elderly have become a major

public health problem. The authors reported that fatal and nonfatal falls increase sharply with age, with the highest occurrence after age 80. For those over 65, the fatality rate from consequences from falls for men is almost 60% higher than women, but nonfatal injury rate for falls was higher among women (Sleet et al., 2008). In 2005, in the United States, almost 15,000 older adults died from consequences resulting from falls, approximately 1.8 million were treated in emergency departments for unintentional fall-related injuries, and 473,000 of those were subsequently hospitalized (Sleet et al., 2008).

Stevens and Rudd (2014) evaluated the circumstances and causes of fall deaths through analyses of multiple causes of death data using the online Centers for Disease Control and Prevention Wide-ranging ON-line Data for Epidemiologic Research System. The researchers analyzed multiple causes of death data from 1999 to 2010 for people 65 and older with fall listed on their death record. The authors found that in 2010, there were 21,649 fall deaths and 5,402 fall-related deaths among older adults; 48.7% of fall deaths involved a head injury. Fall-associated or related deaths were defined as records that included a fall as the contributing cause but not the underlying cause of death. A fall death was defined as the fall listed as the underlying cause of death (Stevens & Rudd, 2014). Death is a major outcome of falls, but serious injury is a common and serious consequence as well.

Injury. In a study conducted to examine fall-related severe head injuries Luukinen, Herala, and Koski (1999) studied community-dwelling and institution-dwelling adults over 70 years of age in five different municipalities. The research focused on head injuries because these injuries increased the risk of cognitive decline in older

adults. Through tracking falls and head injuries as well as participant demographics, the researchers determined that fall-related severe head injuries were rising, increasing with age, and could result in significant cognitive decline and dementia.

In investigating traumatic brain injuries in emergency departments in the United States from 1992-1994, Jager, Weiss, Coben, and Pepe (2000) analyzed data from the National Hospital Ambulatory Medical Care Survey from 1992 to 1994 to describe the incidence and patient characteristics of traumatic brain injuries. The 85 and older age group represented the second highest incidence of Traumatic Brain Injury after the five and under age group. The research established that falls are the most common mechanism of traumatic brain injuries and for effective prevention strategies targeting high-risk individuals (Jager et al., 2000). Traumatic brain injuries are a severe result of falls for older adults.

Sterling, O'Connor, and Banadies (2001) studied geriatric falls focusing on high injury severity, which is disproportionate to the mechanism. The researchers conducted a review of the trauma registry from 1994 to 1998 looking at age, injury severity and mortality. In the study period, 1,512 participants were evaluated with 333 greater than 65 years old. Falls were the cause of injury 48% of the time. The research concluded that falls among the elderly are a frequent source of high injury severity, especially when compared to younger individuals. Review of research confirmed that severe injuries often include traumatic brain injuries and hip fractures (Sterling et al., 2001). Fall injuries cause very specific issues for individuals as well as problems of a broader scale.

In addition to being the leading cause of death by unintentional injury among older adults, Stevens (2003), in looking at public health impact of falls, stated that falls are also a major cause of severe nonfatal injuries and the most common cause of hospital admission for traumatic injuries for the population. In the review, Stevens (2003) provided an overview of the epidemiology of falls among older adults, described current prevention strategies, and highlighted key areas that need to be addressed. The author argued that of older adults who fall, 20% to 30% suffer moderate to severe injuries, which reduce physical function and independence, and increase the risk of death (Stevens, 2003). Fractures were among the most predominant injuries from falls. Each year, between 360,000 and 480,000 older adults sustained fall-related fractures (Stevens, 2003). Falls are a major cause of both fatal and nonfatal injuries, but various fall interventions related to health can decrease these risks and impacts.

Health Fall Interventions. In reviewing literature addressing the significant issue of falls, there were a variety of effective interventions. These varied from exercise to medication management. All interventions were focused on addressing risk factors or causes of falls. This section of the review addresses interventions used to address health risks.

In a systematic review and analysis of forty randomized clinical trials, Chang et al. (2004) assessed the effectiveness of fall prevention interventions in older adults. The authors determined that interventions to prevent falls in older adults are effective in reducing both the risk of falling and the monthly rate of falling. Various strategies have been identified to address modifiable risk factors for falls. Interventions include those

that target environmental, behavioral, and biological risk. Most effective were interventions targeting multiple modifiable risks at once. Through education, older adults can learn facts and risks and how to reduce their personal risk. Each intervention includes education on how varying factors are a risk and how to decrease that risk (Chang et al., 2004). *A Matter of Balance* targets physical risk through exercise, medication information, and blood pressure education. Health-related interventions specifically focus on physical factors.

Physical. As an individual ages, physical factors play an integral role in falls. The literature review demonstrates that a number of these are modifiable risk factors that can be addresses through various interventions, such as exercise, vision checks, and medication management. Exercise is specifically important for older adults in fall prevention.

Benefits of Exercise. Numerous researchers agree the there are significant and important benefits of exercise. Shumway-Cook, Gruber, Baldwin, and Liao (1997) performed a clinical investigation examining the effects of multidimensional exercise program on balance, mobility, and risk for falls. This research examined 105 community dwelling older adults over 65 with a history of two or more falls in the previous six months who received the intervention of an individualized exercise program addressing impairments and functional disabilities. The research consisted of a control group, a fully adherent exercise group, and a partially adherent exercise group. The results included that both exercise groups scored better than the control group, but the greatest reduction in fall risk was reported with the adherent group. The investigators concluded that exercise

can improve balance and mobility and reduce the likelihood of falls among community dwelling older adults who have experienced falling (Shumway-Cook et al., 1997). This study supports the exercise intervention within *A Matter of Balance* and exercise as used as a research measure in this thesis. Exercise was proven as an effective intervention in various studies.

In later research of fall prevention strategies, Stevens (2005) asserted that exercise is a very effective intervention for fall risk. In a special report by the Centers for Disease Control and Prevention and Journal of Safety Research, Stevens (2005) investigated the latest findings in the research community on risk factors and prevention strategies of falls among older adults. The author concluded that various types of exercise programs have been studied and found to be effective, including Tai Chi, balance and gait training, and strength building. Interventions include group classes and individual in-home programs. Exercise reduced the risk of falls by 12% and the number of falls by 19% (Stevens, 2005). Exercise was one of many potential effective interventions.

Similar to the findings of Shumway-Cook et al. (1997) and Stevens (2005), Gillespie et al. (2009) studied effective interventions for falls and fall risk. In this study, the focus was on fall prevention interventions for older people living in the community, Gillespie et al. (2009) conducted a randomized trial of interventions including 111 trial studies, and 55,303 participants, on fall interventions for community-dwelling older adults. Of the interventions of exercise (multiple-component group exercise, Tai Chi, and individual multiple-component home based-exercise), fall risk assessment, Vitamin D, home safety interventions, gradual withdrawal of psychotropic medication, and

pacemakers, the researchers determined that exercise, especially multiple-component group exercise, reduced both rate of falls and risk of falling. Multiple-component exercise programs contain two or more of the following components: strength, balance, flexibility, or endurance. *A Matter of Balance* addresses many of these interventions, which all either reduced falls or risk of falling, but puts a particular emphasis on exercise interventions, particularly multiple-component exercise. Although some researchers investigated exercise as a whole, others focused specifically on one component of interventions, such as balance.

When evaluating the effect of a fall prevention program on balance maintenance, Robitaille et al. (2012) performed a study among community-dwelling elders examining the effect of a fall prevention program offered under real-world conditions. The investigators focused on balance maintenance and the program's impact on falls. This research was a quasi-experimental study including ten community-based organizations and 200 participants and utilized pre and post- measures on balance performance and self-reported falls. Through linear regression to evaluate balance and negative binomial regression to evaluate falls, the researchers found that improvements in balance can be maintained twelve months after the program's conclusion. This supported the inclusion of exercise and balance components in a fall prevention program (Robitaille et al., 2012). *A Matter of Balance* strongly incorporates balance in its program and is evaluated in this thesis through the falls management and exercise research questions. Balance as a significant portion of exercise intervention was further studied in recent years.

In a study of balance, El Khoury et al. (2015) obtained similar outcomes on the significance of balance as Robitaille et al (2012). In a study examining the effectiveness of a balance training program in preventing fall injuries, El-Khoury et al. (2015) analyzed 706 women aged 75 to 85 who lived in their own home with diminished gate and balance capabilities. The intervention consisted of weekly group sessions of balance training offered at the community over a two-year period supplemented by home exercises. In the randomized controlled trial, the researchers evaluated the rate of injurious falls, rates of all falls, physical functioning, fear of falling, physical activity level, and perceived health related quality of life. The results included that at two years, the intervention group members had fewer injurious falls, performed better on all physical tests and had better perception of their overall physical function than those in the control group. The authors determined that exercise programs focusing on balance training are effective in reducing falls and increasing physical function among community-dwelling older adults (El-Khoury et al., 2015). These results are consistent with the inclusion of balance exercises within *A Matter of Balance* and exercise as a research measure in this thesis (CMMS, 2009). The effectiveness and benefit of exercise has been shown here through research. However, many adults do not engage in exercise, which presents a major challenge to effective fall interventions.

Addressing the Exercise Challenge. Despite the numerous benefits of exercise, many older adults are less active than ideal. Many older adults do not participate in leisure time physical activity. Crombie et al. (2004) studied why older people did not participate in leisure time physical activity. The study surveyed activity levels, beliefs,

and deterrents to address the issue of why older adults do not participate in physical activity and identified strategies to increase activity. The cross-sectional study included 409 older adults from 65 to 84 years of age who lived independently. Results indicated that the knowledge of the health benefits of exercise was high, but 36% did no leisure time activity and 17% did less than two hours per week. The highest deterrent was lack of interest. The authors determined that to raise interest in physical activity, health education campaigns could highlight the non-health benefits of physical activity that are significant and valued by many older adults. These include socializing and enjoyment of the activity itself. Rather than just focusing on the physical activity component, programs can focus on involvement in physical activities of interest to older adults such as bowling and dancing (Crombie et al., 2004). Researching the reasons why many older adults do not exercise is important for interventions within a fall prevention program. This will allow the program to target these reasons while participants are in the Contemplative stage of the TTM. In *A Matter of Balance,* participants go through the process of action planning to identify barriers to exercise in order to increase likelihood of success. There are many barriers to exercise for older adults, and some researchers specifically focused on the individual's self-perception and beliefs.

In addition to general barriers to exercise, Stevens et al. (2010) investigated fall prevention and exercise barriers from the perspective of personal characteristics including perceptions, beliefs, and behaviors. In this comprehensive overview of current research, the authors reported that a factor that facilitates adopting fall prevention strategies includes low-intensity exercise, and a barrier is no previous history of exercise. The

authors also identified social support and the perception of program relevancy as factors that encourage fall intervention adoption (Stevens et al., 2010). Approaching exercise in these manners assists participants from going to the Precontemplative to Contemplative and Contemplative to Action stages in the TTM model. Participants must believe in the intervention as effective and that they can be personally successful (Prochaska & DiClemente, 2005). Exercise was identified as a central factor in this thesis and *A Matter of Balance as* one of the three research measures (CMMS, 2009). In addition to exercise, there are multiple other physical function and medical factors that are associated with falls and fall risk.

Physical Function and Medical State. There are numerous physical factors of aging that increase the risk of a fall. In looking at the evidence of falls and fall prevention, it was determined that thorough medical evaluation and intervention can help prevent falls (Rubenstein & Josephson, 2006). Key areas include medication management, elder's sensory changes, and the impact of changes in physical function.

Medication review and management is vital to fall prevention. Leipzig et al. (1999) evaluated the evidence linking psychotropic drugs with falls in older adults through fixed-effects meta-analysis. The survey utilized forty studies for a systematic evaluation of drug use with falling in people over age sixty. The authors reported that many older adults use psychoactive medications, which increase the risk of falling. Decreasing the use of multiple medications and specific types commonly prescribed to older adults, including tranquilizers, sleeping pills, and anti-anxiety drugs decreases the

likelihood of falling (Leipzig et al., 1999). Medication management is one of the multiple health factors that needs to be addressed in fall interventions.

In a comprehensive review of risk factors and prevention strategies for falls, Stevens (2005) identified additional physical health factors needing intervention. This article reported on the latest research findings related to fall risk and prevention in a literature and research overview. The author reported that eye and vision checks could improve an older adult's effort to avoid falls. Identifying and treating symptoms of certain chronic diseases such as Parkinson's Disease, a history of stroke, and arthritis may reduce the risk of falling (Stevens, 2005). Each of these factors should be included in a personal risk assessment for falls in intervention programs. These are included in *A Matter of Balance* program, and measured in this thesis by the question if the older adult participant feels that they can find a way to reduce falls. In addition to these physical factors, blood pressure can significantly impact falls and fall risk.

In another study, Rubenstein (2006) conducted a comprehensive review of research of epidemiology, risk factors, and strategies for prevention of falls. In his report, he established that blood pressure should be checked and treated as a preventative measure to falls. To help with fall risk reduction, it was recommended that an individual move slowly when getting up to decrease risk of falling because of postural hypotension (Rubenstein, 2006). During *A Matter of Balance*, one activity is devoted to understanding how blood pressure can increase fall risk and steps to take preventative measures as explained above. By understanding the reasoning behind an intervention and discussing strategies of prevention, the program intervention takes participants from the

Precontemplative to Action stage in reducing that specific fall risk (Prochaska & DiClemente, 2005).

Health factors, including impacts, risks, and interventions are very significant in the effect and prevention of falls for older adults. Each of these needs to be considered when developing and evaluating a fall prevention program. An additional element of importance for falls is psychological factors.

Psychological Factors and Falls.

Research consistently recognizes the severe impact of falls on various levels including psychological impact. In a comprehensive literature review of the impact of falls on the elderly, Boye et al. (2012) asserted that falls affect a large percentage of older adults, and have a significant psychological impact including fear of falling, social isolation, poor quality of life, and reduced independence. In relation to falls, psychological factors are significant in risk, impacts, and interventions.

Whether or not falls result in injury, they significantly affect quality of life. Fear of falling is common among older adults who may or may not have experienced a fall (Vellas, Wayne, Romero, Baumgartner, & Garry, 1997). Fear of falling can result in limited activity and social interaction, causing depression, social isolation, and physical decline. Falls can also have significant psychological consequences. Many older adults who fall, whether or not they sustain injuries, develop a fear of falling (Vellas et al., 1997). Fear of falling relates to the Stages of Change theory to assist in understanding issues and patterns of change to mitigate fall risk.

The Stages of Change Theory is useful when working with individuals to adopt improved behaviors and mitigate fall risk as well as when structuring and implementing a fall prevention program (Sleet et al., 2010). It is important to consider behavioral approach with fall prevention. Behavior change is crucial for a decrease in injuries and risk of injury (Sleet et al., 2008). Within psychological factors, there are important risk factors, impacts and interventions that play a large role in the influence and prevention of falls for older adults.

In *A Matter of Balance*, there is a focus on addressing fear of falling through activities, videos, and group discussion (Smith et al., 2012). In this thesis, the psychological factor in fall prevention is measured through the survey question, *In the last four weeks, to what extent has your concern of falling interfered with your normal social activities with family, friends, neighbors, or groups?* As one of the three measures in this thesis, psychological impact is very significant to fall prevention and this research.

Psychological Risk Factors for Falls. Older adults face various risk factors, including psychological factors, increasing the likelihood of a fall. Most falls result from the interaction of multiple risk factors. The likelihood of a fall increases with the increasing number of risk factors present. Risk factors can be either intrinsic (originating within the person, such as psychological health, age, gender, leg weakness) or extrinsic (originating outside of the body, such as environmental hazards) (Stevens & Phelan, 2013). Psychological risk factors include those relating to human actions, emotions, or choices. Some of these can be modified such as risky behavior, fear of falling resulting in

inactivity, and excess alcohol use through strategic interventions. The high prevalence of fear of falling among older adults in the United States is an important concern.

A study assessed the perception of falling as a health problem through a survey of community-dwelling elderly people. Braun (1998) performed a study with resident council meeting attendees at three apartment buildings for older adults to assess the perception of falling as a health problem, determine the perceived importance of fall-related risk factors, and to identify personal characteristics and attitudes associated with perceived importance of fall-related risk factors among community-dwelling elders. A chi square test, analysis of variance, and linear regression were used to analyze data of 120 participants. The results indicated that eighty-six percent of subjects thought falling was preventable and was moderately important compared to other health issues. Also, older adults' perceptions of personal likelihood of a fall were significantly lower compared to their perceived risk for other elders. The author argued that many community dwelling elders consider falls to be preventable and comprehend the importance of fall risk factors, but do not consider themselves to be vulnerable to falling. If an individual does not consider himself personally at risk, he may be more likely to engage in behavior that puts him at risk of falling. As the Stages of Change Theory asserts, it is important to consider behavior and perception to achieve behavior change. This is a crucial aspect of decreasing injury and risk (Sleet et al., 2008). Perception of risk in personal interventions and fear of falling associate with the frequency of falling and prevalence of fear of falling.

A study was implemented to determine the frequency of falls and prevalence of fear of falling. Boyd and Stevens (2009) examined 1,709 adults 65 and older through a cross-section telephone survey in the United States from 2001 to 2003. Questions in the survey were used to calculate recent falls, fall injuries, fear of falling, and fall prevention beliefs and behaviors. The researchers concluded that fear of falling can result in adverse health effects including decreased quality of life, functional limitations, restricted activity, and depression. Reducing fear of falling can help older adults maintain physical and mental health and prevent falls (Boyd & Stevens, 2009). Addressing fear of falling not solely focusing on the physical risks, is important to fall prevention programs.

In a comprehensive literature review, researchers investigated perceptions, beliefs and behaviors of falls and fall prevention. Stevens, Noonan, and Rubenstein (2010) analyzed research on the psychological factor of fall prevention. The authors concluded that falls and fear of falling are interrelated; each is a risk factor for the other. They also determined that some older adults believe the misconception that falls are an inevitable consequence of aging, while others do not see themselves as personally susceptible (Stevens et al., 2010). Psychological factors are significant risks for falls in older adults. Within the Stages of Change theory, psychological risks should be identified at each stage. In the beginning stages, knowledge of these risks help the individual move from one stage to another. Once the behavior change is accomplished, the continual awareness of possible risks is important to prevent relapse (Prochaska & DiClemente, 2005). The research of psychological risks supports the thesis author's decision to include it as one of

the four measures of program effectiveness. The risks as well as psychological impacts of falls are important to understand in fall prevention.

Psychological Impacts of Falls. In reviewing the literature of fall impacts, many authors recognized that, in addition to the physical effects, falls significantly impact psychological and social health and quality of life. Fear of falling is a problem for a significant number of older adults, and it has the potential to significantly impact older adults in terms of morbidity and quality of life. Lach (2005) conducted a cohort study with annual follow-up of two years of 890 community-dwelling older adults over age 65. Over two years, the prevalence of fear of falling increased from 23 to 43%. Lach argued that fear of falling is a major health problem among elderly living in the community, for both older individuals who have and have not fallen. Three factors for developing fear of falling include worsening health status, feeling unsteady, and having two or more falls. Even though they may not sustain an injury, many people who fall develop a fear of falling (Lach, 2005). Fear of falling also often leads to activity avoidance.

Another study assessed prevalence rates and analyzed correlates of fear of falling and activity avoidance due to fear of falling. Zijlstra, van Haastregt, van Eijk, van Rossum, Stalenhoef, and Kempen (2007) performed a cross-sectional study of 4,031 community dwelling older adults aged 70 and older. The researchers analyzed surveys completed by 4,031 older adults. The questionnaires assessed fear of falling and associated avoidance of activity. Conclusions of the study included that 54% of older adults living in the community reported fear of falling and 38% reported avoiding activity due to fear of falling. A strong correlation with fear of falling and related activity

avoidance was poor perceived general health (Zijlstra et al., 2007). Fear of falling and activity avoidance can actually increase fall risk.

In another study of fear of falling, Scheffer, Schuurmans, van Dijk, van der Hooft, and Rooij (2008) sought to study methods to measure fear of falling, study the prevalence among fallers and non-fallers, identify risk factors of fear of falling, and consequences through a systematic review of 28 relevant studies among the community-dwelling elderly. The main risk factors for developing fear of falling are at least one fall, being female, and being older. Consequences include decline in physical and mental performance, increased risk of falling, and progressive loss of quality of life (Scheffer et al., 2008).

Fear of falling is strongly linked with future falls (Stevens, 2003). Boyd and Stevens (2009) designed a study with the objective of estimating the frequency of recent falls and prevalence of fear of falling among older adults 65 and older. The study determined that of older adults in the United States, 12.9 million, or 36%, were moderately or very afraid of falling. This can result in adverse health outcomes including decreased quality of life, functional limitations, restricted activity, and depression (Boyd & Stevens, 2009).

Within the Stages of Change model, it is important for individuals to understand the impacts of their behavior. Without this knowledge, awareness, and acceptance, this person will not be able to progress through the stages, especially from Precontemplation to Contemplation. Psychological impacts of falls had significance in this study for the same reason. It was important for participants to go through the process of understanding

how psychological factors impact both their risk of falling and their overall quality of life (Prochaska & DiClemente, 2005). With a base knowledge of the risks and impacts of falls, participants were more prepared to receive the psychological interventions for falls that the program leaders facilitated.

Psychological Interventions for Falls. There are a variety of effective interventions that may address issues related to falls. Interventions include those that target physical, psychological, and environmental risk. Through education, older adults can learn facts and risks and how to reduce their personal risk. Each intervention ideally includes education on how varying factors are a risk and how to decrease that risk (Chang et al., 2004). The adoption of changes in behavior is very important when considering fall interventions (Sleet et al., 2010). Individuals moving through each stage must respond to psychological interventions. To move from Precontemplative to Contemplative stage, the elders need to understand that they are personally susceptible to the negative impacts of their behavior. They must have the self-efficacy and confidence gained by psychological interventions to move from the Preparation to Action Stage. To successfully stay in the Maintenance stage, an individual must be aware of the risk of relapse and self reflect on ways to avoid this (Prochaska & DiClemente, 2005). In this thesis, the psychological factors are included throughout the fall program interventions such as in group discussion and social support. It is also included in one of the key program measures as the outcome assessing fear of falling reduction. Psychological interventions are focused on behavioral factors, including fear of falling, increasing self-awareness, fall risk assessment, and social support.

Behavioral. The review of the literature determined that many interventions require behavioral change on the part of the older adult. Therefore, behavioral risk mitigation is a crucial component of fall prevention. The Stages of Change Theory is useful when focusing on the psychological aspects of falls and fall prevention. A large portion of fall prevention relies on individuals adopting improved behaviors and mitigating fall risk (Sleet et al., 2010). Behavior change is also crucial in a decrease in injuries and risk of injury. Boyd and Stevens (2009) assert that older adults' psychological barriers, including fear of falling and their reluctance to adopt behaviors that could prevent future falls, should be considered when designing fall prevention programs. A decrease in injury and injury risk is extremely rare without behavior change (Sleet et al., 2010). Within behavioral interventions, fear of falling was researched and investigated as a significant component.

Fear of Falling. A study investigating the incidence and risk factors for fear of falling in older adults utilized a longitudal and prospective cohort study with annual follow-up for two years. The study consisted of 890 community dwelling elders over 65. Annual interviews were used to collect demographic data, falls, injuries, balance, fear of falling, cognition, health, and functional status. Results included that prevalence of fear of falling increased significantly over two years. Lach (2005) argued that fear of falling should be considered for inclusion in existing and new education programs because of high prevalence and incidence among older adults. This supports the need for screening and interventions for older adults in community settings (Lach, 2005). This supports that

fear of falling is incorporated in A Matter of Balance and as a research question in this thesis.

Another study investigating fear of falling comprised of a systematic review of 28 studies. Scheffer et al. (2008) performed the study to look at prevalence, risks, and consequences of fear of falling. Results concluded that risk factors for developing fear of falling are at least one fall, being female, and being older. Consequences included decline in physical and mental performance, increased risk of falling, and loss of quality of life. The study established that knowledge of risk factors of fear of falling through education may be useful in developing multidimensional strategies to decrease this fear and improve quality of life (Scheffer et al., 2008). Quality of life can easily be linked to reducing fall injury. This supported fear of falling being incorporated into this thesis as a research measure.

Another study related to fear of falling evaluated the effectiveness of a balance program on fall injury reduction. El-Khoury et al. (2015) designed a study of twenty sites in urban settings of women between 75 and 85 with increased fall risk and injury and living in the community. The intervention consisted of weekly supervised group sessions of progressive balance training offered in community based premises for two years, supplemented by individually prescribed home exercises. In the intervention group there were 352 participants and the control group with no intervention had 453. The two participating groups were compared for rates of injurious falls, rates of all falls, physical function, fear of falling, physical activity, and perceived health related quality of life. The authors determined that an exercise and balance program can help to reduce fear of

falling (El-Khoury et al., 2015). This study supports that exercise should be included in fall prevention programs, such as A Matter of Balance. It also contributes to the support of both exercise and fear of falling included as two of the four measures of effectiveness evaluated in this thesis. This literature review section has supported that fear of falling is an important psychological intervention for fall prevention programs. Another important aspect is increasing self-awareness.

Increasing Self-Awareness. Increasing awareness of fall risk and education about fall prevention strategies can effectively reduce chances of falls and injuries. In a comprehensive literature review, Stevens, Noonan, and Rubenstein (2010) investigated perceptions, beliefs and behaviors of falls and fall prevention. The authors analyzed research on the psychological factor of fall prevention. In researching fall prevention related to older adult perceptions, beliefs, and behaviors, Stevens et al. (2010) drew a variety of conclusions related to self-awareness and engagement in fall prevention. These included that there are various factors that facilitate the acceptance and adoption of fall interventions, including a perception that the programs are personally relevant. Barriers included fatalism, denial of risk, and poor-self efficacy. To increase likelihood of participation and engagement, fall interventions should be depicted as lifestyle enhancing and key in maintaining independence. The authors recommended that messages emphasize positive health and social benefits such as improving balance and keeping independence rather than focusing on negative facts about falls and fall injuries (Stevens et al., 2010). Central to *A Matter of Balance* program was the inclusion of positive health and social benefits (Sleet et al., 2012). A focus on self-awareness is important in

messaging by the program and its facilitators. Self-awareness can also be addressed and furthered through a fall risk questionnaire.

Another study investigated the use of a fall risk questionnaire to increase self-awareness for older adults of fall risk. Rubenstein, Vivrette, Harker, Stevens, and Josea Kramer (2011) conducted the study with 40 participants age 65 and over recruited from a Veterans Affairs medical facility and assisted living. Participants completed an evidence-based, self-rated fall risk questionnaire. The objective of the study was to provide an initial clinical and statistical validation for a public health strategy of fall risk assessment by older adults using a Fall Risk Questionnaire. The results of the self assessment were compared to clinical evaluation of risks using the American/ British Geriatrics Society guidelines to assess independent predictors of falls including history of previous falls, fear of falling, gait/ balance, muscle weakness, vision, depression, and medications. A conclusion of the study was that increased self-awareness of fall risk and fall facts can raise older adults' awareness of their personal fall risk, as well as help to initiate conversation with health care providers or family about fall prevention (Rubenstein et al., 2011). Increasing self-awareness is crucial during the Precontemplative to Contemplative stages within the Stages of Change model (Prochaska & DiClemente, 2005). *A Matter of Balance* program incorporated awareness of personal risk of falling, strengths, and weaknesses into its intervention program to increase the likelihood an older adult will adopt behavior changes and have the self-awareness, self-confidence, and self-efficacy to succeed in mitigating risk (Sleet et al., 2012). Self-awareness is critical to fall prevention and one manner of achieving this is through a fall risk assessment.

Fall Risk Assessment. Fall assessments can be used as part of a successful fall prevention program. Perell et al. (2001) conducted a review of research of fall risk assessments. The researchers reviewed twenty-one articles published from 1984 to 2000 describing twenty fall risk assessments. The majority of the scales targeted older adults in an institutional setting. Assessments commonly include physical function, balance, strength, exercise, mental status, mobility, fall history, medications, sensory deficits, use of assistive devices, and cognitive impairment. The review determined that a quick and effective assessment can be an integral part of implementing an effective and efficient program and these scales can be used with confidence as part of an effective program (Perrell et al., 2001). Various studies identified the fall risk assessment tool as integral to fall prevention programs.

A fall risk assessment tool is important because although one-third of older adults fall, many do not recognize or acknowledge personal risk (Braun, 1998). The assessment can help to raise an individual's awareness of their fall risk as well as to initiate discussions about falls. The assessment can help to further or inform the efforts of community organizations to prevent falls and improve the health and quality of life of older adults (Rubenstein et al., 2011).

Another study assessed effective fall interventions. Chang et al. (2004) analyzed 40 trials to evaluate program effectiveness. Through a systematic review and meta-analysis, the authors investigated components of fall intervention, including multifactorial falls risk assessment, exercise, environmental modification, and education. A multifactorial falls risk assessment includes components addressing physical function,

balance, strength, exercise, mental status, mobility, fall history, medications, sensory deficits, use of assistive devices, and cognitive impairment. The authors determined that the most effective intervention was a multifactorial falls risk assessment and management program to reduce risk of falling and rate of falling (Chang et al., 2004). *A Matter of Balance* incorporated a fall risk assessment tool completed by participants to self-assess their risk. This assessment can help the participant in the program move from the Precontemplative to Contemplative stage of TTM because the individual will become more aware of their behavior that can have a negative effect. The assessment is also useful during the Preparation stage because the elder is realizing which behaviors or habits need to be addressed to reduce risk (Prochaska & DiClemente, 2005). Some fall programs are structured to include social interaction with participants.

Social Support. Fall interventions in a group help provide social contact and support for participants. In a study to evaluate activity avoidance among older adults, Zijlstra et al. (2007) performed a cross-sectional study of 4,031 community dwelling older adults age 70 and over. The research determined that social support helps to motivate attendance and provide positive results (Zijlstra et al., 2007). Participants are more likely to adopt fall intervention strategies if there is social support. In the review of older adults' perceptions, beliefs, and behaviors related to fall prevention, Stevens et al. (2010) assert that the program should focus on positive social benefits for participants including quality of life and staying socially engaged.

Psychological factors play a large role in both increasing and mitigating the risk of falling for older adults. Psychological factors connect to the Stages of Change theory

because any change of risky behavior that an individual achieves requires psychological analysis, self-reflection, and self-efficacy to accomplish (Prochaska & DiClemente, 2005). This section of the literature review supported the inclusion of a variety of psychological factors and interventions into *A Matter of Balance*, including fear of falling, self awareness, fall risk assessment, and social support. This is an important aspect to be included in fall prevention programs, and was considered in the study of fall prevention in this thesis. An additional significant aspect in falls for older adults are financial factors.

Financial Factors and Falls

Research consistently recognized the severe impact of falls on various levels, including death, injury, hospitalization, psychological impact, and cost. In a comprehensive review of the impact of falls on the elderly, Boye et al. (2012) asserted that falls affect a large percentage of older adults and have a significant impact including high morbidity and mortality rates, injury, fear of falling, social isolation, loss of physical function, poor quality of life, and reduced independence. These impacts place a large burden on healthcare systems because falls result in high incidence of emergency department visits, hospital admission, admissions to rehabilitation and long-term care facilities, and other needed health services. Key areas within financial factors include risks and impacts. Financial factors are important to consider for falls both in terms of increased risk for older adults of lower financial status as well as impact on the individuals, families, and society.

Financial Risk Factors for Falls. Financial risk factors for falls burden older adults who are low-income. Over two million low-income older adults live in thousands of affordable housing properties all over the United States. These residents often represent a vulnerable population (LeadingAge, 2014). Due to advancing age, low-income status, and other demographic characteristics, many residents cope with multiple chronic illnesses and deteriorating physical and mental functioning. This decline can impede their ability to live safely and independently in the community. These factors put residents at risk for poor health outcomes and make it more likely that residents will use costly health and long-term care services (LeadingAge, 2014). Higher needs equate to higher costs for Medicaid and Medicare. The increasing older adult population is expected to exacerbate these challenges (Enterprise Community Partners & LeadingAge, 2011).

Socioeconomic risk factors are related to social conditions and economic status of individuals. These risk factors include low income, limited healthcare access, low education, inadequate housing, and lack of community resources. The situations in which people live significantly impact their health. Social and economic factors, health-related behaviors, and the physical environment are the greatest influence on a person's health. (LeadingAge, 2014).

There is a relationship between low socioeconomic status and falls. The World Health Organization's Global Report on Falls Prevention in Older Age wrote that socioeconomic factors, low-income status, poor education, and inadequate housing are risk factors for falls (WHO, 2008). Additionally, Reyes-Ortiz et al., (2004) performed a

study to estimate the prevalence for falls and risk factors associated with falls in Mexican-American adults age 72 and older in a 2-year cohort study in Southwestern states. The researchers collected data on sociodemographic characteristics, health, cognitive function, physical function, and body mass index. Two years later, the 1,391 participants self-reported falls from the previous twelve months. The authors used chi-square, univariate statistics, and regression analyses. Socioeconomic demographic characteristics, health status and other performance measures were analyzed. Data demonstrated that lower income is associated with higher risk of falling (Reyes-Ortiz et al., 2004).

In another study on age and education level, Li, Song, Yu, de Zhou, and Zhang (2013) sought to study the relationship of age and education with fall-related injuries. The authors used multistage cluster sampling, standardized questionnaires, hospitals, and mortality registry systems. The results included that 674 of the total 45,857 participants sustained fall related injuries. Mortality increased significantly among individuals 55 and over for female and 60 and over for male. The researchers also found that individuals with an education level under primary school were more likely to obtain fall injuries. The authors concluded that fall injuries were inversely related to the elders' educational levels demonstrating that there is a high risk of falling for older adults with lower educational levels (Li et al., 2013). Education level can be linked to socioeconomic status, so it is important to consider with fall prevention.

When considering falls, investigating financial aspects is crucial to understand the magnitude of the problem of falls for older adults as well as its ability to increase risk for

falls for older adults. Consideration of heightened fall risk for those of lower socioeconomic status is central to this research because the program evaluation in this thesis is of three affordable housing communities, where residents make from thirty to fifty percent of the area median income (AMI). The financial risk factors described in this section have a large impact on individuals, health care systems, and general society in relation to falls.

Financial Impact of Falls. Fall injuries cause substantial financial burden. In an analysis of the economic dimensions of slip and fall injuries, Englander, Hodson, and Terregrossa (1996) authored a paper to analyze annual economic costs caused by fall injuries. These costs include medical, rehabilitation, hospital costs, and the costs of morbidity and mortality. The authors quantified that the total direct costs of fall injuries for older adults in 1994 was $20.2 billion and by 2020 is expected to be $32.4 billion. (Englander et al., 1996). The financial costs to the health care system and society caused by falls is vast.

Investigating the direct medical costs of falls among the community-dwelling elderly, Carroll, Slattum, and Cox (2005) drew from a sample of 4,025 consumers in a survey of non-institutionalized older adults in the United States. The researchers indicated that the direct cost was six to eight billion dollars per year in the United States. The study determined that fall injuries are among the twenty most expensive medical conditions (Carroll et al., 2005). With the aging US population, both the number of falls and the costs to treat fall injuries are likely to rise.

In another study, Stevens et al. (2006) estimated the incidence and direct medical costs for fatal and non-fatal fall injuries among adults aged 65 and older in the United States in 2000. The results include that in 2000, fatal and nonfatal fall-related injuries among adults aged 65 and older resulted in $19.5 billion in direct medical care costs. Medical costs for fatal falls totaled $179 million. Costs for nonfatal injuries totaled $19.3 billion, of which 63% was for injuries that required hospitalization, 21% for injuries treated in emergency departments, and 16% for injuries treated in outpatient settings. Traumatic brain injuries and injuries to the lower extremities were the most common and expensive injuries, accounting for 78% of fatalities and 79% of costs. The incidence of non-fatal falls varied little by age, but the costs double between 65 and 74 years of age. Women made up 58% of older adults, but fall injuries among women was 2.3 times higher and the costs 2.8 times higher than for men (0.5 million to 0.7 million) while costs doubled ($3 billion to $6 billion). The average hospital cost for a fall injury is $35,000 and the cost of treating fall injuries increases with age. Medicare pays for about 78% of the costs of falls (Stevens et al., 2006). Falls and fall injuries represent an enormous financial burden to individuals, society, and the health care system. With the rising population, fall prevention programs are an important intervention, specifically for older adults in low-income settings. In addition to financial factors, environmental aspects of falling need to be considered in terms of their impact, risk, and interventions.

Environmental Factors and Falling

Falls have a severe effect on many levels, including environmental. Environment affects falls and falls can unfavorably change a person's environment. Many falls can be

attributed to the interaction between identified environmental hazards and increased physical susceptibility to hazards from accumulated effects of aging and disease. Consequences of falls and fall-related injuries, which often result from environmental factors, include entry in higher levels of care and reduced independence (Rubenstein, 2006). Rubenstein and Josephson (2006) evaluated the evidence of fall prevention in the elderly and concluded that careful environmental evaluation and intervention can help prevent falls. A crucial factor in approaching fall intervention and prevention is to incorporate the Stages of Change Theory. Although the physical and social environment plays a role in encouraging or encumbering healthy behavior, individual risk-taking behaviors are powerfully shaped by environmental and personal aspects that are modifiable with prevention interventions. A decrease in injury and injury risk is extremely rare without behavior change (Sleet et al., 2008). This includes deciding to make changes to the surrounding environment and how an individual interacts with it. Environmental factors are supported in the TTM stages, specifically Contemplation, Preparation and Action (Prochaska & DiClemente, 2005). The environmental factors of falls are significant in this thesis because the program was implemented within housing; therefore, the setting of the program and a focus on the mitigating risk in the surrounding environment is critical to fall prevention. The environment impacts falls specifically in terms of risk factors, impacts, and interventions.

Environmental Risk Factors for Falls

Environmental risk factors result from the interaction of the individual and the environment. Carter, Campbell, Sanson-Fisher, and Gillespie, (2000) assessed the

prevalence, type, location of, and injuries from accidents occurring in the home through interviewing 657 older adults and conducting a home hazard check. The study sought to explore whether variables including socio-demographic factors and home hazards were associated with falls. Approximately 80% of homes have at least one hazard and 39% have 5 plus hazards. The authors determined that having more than five hazards and infrequent healthcare provider visits was associated with at least one fall (Carter et al., 2000). Environment is a significant risk factor because of numerous hazards that can be present in homes, which is where many older adults spend much of their time.

Stevens (2003) performed a comprehensive literature review investigating research covering the public health impacts of falls. The author determined that as many as 40% of community dwelling older adults fall each year. The majority of these individuals living in the community spent a large potion of their time at home. Therefore, it was not surprising that between one-half and two-thirds of falls, and 60 percent of fatal falls occur in or around the home (Stevens, 2003). The increased risks of falling at home necessitates more in-depth investigation of individual risks.

In a comprehensive literature review of fall research, Stevens (2005) assessed risk factors and prevention strategies of falls, including environmental risks. These incorporated home hazards, such as poor lighting, lack of stair railings and grab bars, unstable furniture, loose rugs, electrical cords and wires, and clutter and hazardous features in public spaces, such as slippery floors, cracked and uneven sidewalks, and poor lighting (Stevens, 2005). There may be a lack of supportive features in key areas such as

outdoor steps, indoor stairs, and unsafe bathrooms. Hazards present in the home pose a substantial risk to older adults.

Environmental risk factors connect to the Stages of Change Theory in a variety of ways. Older adults need to understand the risk presented by an unsafe environment and decide that they should make changes to their environment (Contemplation), need to prepare to change the risks in their environment (Preparation), and take action to reduce risk of falling in their environment (Action) (Prochaska & DiClemete, 2005). Environmental risks are significant to this thesis because mitigating fall risk commonly necessitates environmental modification. One session in *A Matter of Balance* assessed the environmental risk of falling in one's home and community. The risk factors discussed in this section can result in serious impacts for older adults.

Environmental Impacts of Falls

Environmental impacts of falls affect older adults in that environmental risks cause falls and consequences of falls often result in environmental changes, include entry in higher levels of care and reduced independence (Rubenstein, 2006). A severe impact of falls is hospitalization and long-term care. Each year, approximately 8% of adults 70 years and older will be treated in emergency departments for fall-related injuries, and a third of these patients will be hospitalized. In a review of public health impact of older adults, Stevens (2003) noted that of the individuals hospitalized, half will require long-term care, which often results in nursing home placement.

A study covering environmental impacts was conducted by Tinetti and Williams (1997). The authors investigated the risk of admission to a nursing home due to falls with

a prospective study of a probability sample. The study sample included 1,103 people living in the community over 71 years old. The authors obtained baseline and one year data on demographics, medical characteristics, use of health care, and cognitive, functional, psychological and social function through in-home assessments. The results were that 133 participants, or 12.1% had long-term admission to nursing homes and the risk increased for participants with the number and severity of falls. The association between falls and nursing home admission was strong and significant. The researchers determined that among older people in the community, falls are a strong predictor of skilled-nursing facility placement (Tinetti & Williams, 1997). Falls may impact an elder by necessitating a move into a higher level of care and decreased independence. This is a severe environmental impact.

In another study, Hartholt, Stevens, Polinder, van der Cammen, and Patka (2011) conducted research in order to determine secular trends in unintentional fall-related hospitalizations in individuals 65 and older in the United States. The researchers obtained data from a nationally representative sample of emergency departments from 2001 to 2008 to estimate the number, incidence rates, and annual percentage change of fall-related hospitalizations. Their research concluded that from 2001 to 2008 fall-related hospitalizations in older adults increased 50%, from 373,128 to 559,355. Rates were higher among women compared to men, and the age-adjusted incidence rate showed an average annual increase of 3.3%. The number and rate of fall-related hospitalizations increased significantly. The authors conclude that preventative action is needed to slow the rising hospitalization which leads to higher healthcare costs and poorer health

outcomes for older adults (Hartholt et al., 2011). The environmental impact of falls was severe and significant for older adults and health care systems. These fall outcomes need interventions to slow these impacts.

Environmental Interventions for Falls

In reviewing the literature on addressing the significant issue of falls, there were a variety of effective interventions. In a systematic review and analysis of randomized clinical trials, Chang et al. (2004) reviewed 40 studies of older adults to assess the effectiveness of interventions to prevent falls. Data extracted from Medline, HealthSTAR, the Cochrane Library and other health databases included various fall interventions: multifactorial fall risk assessment with management program, exercise, environmental modification, or education. The researchers determined that interventions to prevent falls in older adults are effective in reducing both the risk of falling and the monthly rate of falling. Various strategies have been identified to address modifiable risk factors for falls. Interventions include those that target environmental, behavioral, and biological risk. Most effective are interventions targeting multiple modifiable risks at once. Through education, older adults can learn facts and risks and how to reduce their personal risk. Each intervention includes education on how varying factors are a risk and how to decrease that risk. (Chang et al., 2004). There are multiple effective fall interventions, and home modification specifically addresses environmental factors.

Home Modification. A review of accidental injuries for older adults determined that falls were preventable with careful environmental evaluation and intervention. The

home environment is linked to 35% to 40% of falls (Josephson, Febacher, & Rubenstein, 1991). Research is necessary to identify strategies to mitigate this risk.

In a study investigating environmental hazards, Stevens, Holman, and Bennett (2001) evaluated the impact of an intervention to reduce home fall hazards. The study consisted of 570 community-dwelling elders 70 and over in the intervention group of the randomized control trial. The intervention was delivered by registered nurses and consisted of a home hazard assessment, an education strategy on general fall hazard reduction and ways to reduce identified home hazards, and free installation of safety devices (grab bars, nonslip stripping on steps, and double sided tape for floor rugs) in the home. In study analysis, hazard prevalence was assessed at baseline and eleven months later. Results included that all homes had at least one fall hazard, and the intervention was associated with a reduction in four of the five most prevalent hazards. The authors concluded that fall hazards are pervasive in the homes of the elderly, and interventions can result in a reduction of the number of hazards. Recommendations on ways to intervene for home hazard reduction include first a home hazard assessment and secondly advice and education on harm reduction (Stevens et al., 2001). Home hazards and modification are proven in this study to be a severe risk to older adults and an effective tactic to reduce falls, respectively.

Some studies have demonstrated that home modification alone will not reduce falls, but environmental factors do play a part in a large portion of home falls. An effective measure in risk mitigation is home assessment and modification. In a thorough literature review of effective fall prevention strategies, Stevens (2005) determined that

tactics to reduce risk of falling include removing tripping hazards, using non-slip mats in the bathroom, installing grab bars in the bathroom, putting handrails on steps, and improving lighting.

The Stages of Change Theory is useful when working with individuals to adopt improved behaviors and mitigate fall risk in their environment (Sleet et al., 2010). It is important to consider behavioral approach with fall prevention, specifically with environmental changes. An older adult must decide to actively change a behavior or instigate a change, such as installing grab bars, removing electrical cords, and ensuring rugs will not slip to modify their environment to reduce the risk of falling. Injury-related behaviors cannot be separated from the environments in which they take place (Sleet et al., 2008). In *A Matter of Balance,* one session focused on environmental interventions. As supported by the research above, this included risk education, home fall risk assessment, and modification recommendations. Environmental modification as an effective intervention is measured in this thesis within the research question of falls management, *I can find a way to reduce falls*.

When considering the risks, impacts, and interventions of falls for older adults, it is critical to take a holistic view and look at these in terms of health, psychological, financial, and environmental aspects. It is important to integrate these aspects of falls with the Stages of Change Theory and specifically assess the distinct needs of and opportunities for elders in affordable housing. The subsequent section reviews the connection among affordable housing, older adults, and fall prevention.

Elders in Affordable Housing

Over two million low-income older adults live in thousands of affordable housing properties all over the county. These residents often represent a vulnerable population (LeadingAge, 2014). Due to advancing age, low-income status, and other demographic characteristics, many residents cope with multiple chronic illnesses and deteriorating physical and mental functioning. This decline can impede their ability to live safely and independently in the community. These factors put residents at risk for poor health outcomes, and make it more likely that residents will use costly health and long-term care services (LeadingAge, 2014). Higher needs equate to higher costs for Medicaid and Medicare. The increasing older adult population is expected to exacerbate these challenges (Enterprise Community Partners & LeadingAge, 2011). This thesis, Evaluation of a Fall Prevention Program for Older Adults in Affordable Housing Communities, focuses on a fall prevention program's effectiveness for the specific population of elders living in affordable housing. The background of health status of low-income older adults in affordable housing, the connection between housing and health, and opportunity to address falls in affordable housing covered in this section provide an overall comprehension of the unique factors and opportunities faced by low-income residents and presented by affordable housing communities.

Health Status of Low-Income Older Adults in Affordable Housing

To investigate the connection between housing and healthcare, LeadingAge published a report on housing and healthcare as partners in healthy aging. Information in the report included that more than two-thirds of the United States Department of Housing

and Urban Development-assisted residents age 65 and over were dually enrolled in Medicare and Medicaid. More than half who were dually enrolled had five or more chronic conditions (LeadingAge, 2014). Residents in affordable senior housing generally have reached advanced age and have very low income, multiple chronic illnesses, and low health literacy levels. The circumstances in which people are born, grow up, live, work, and age can have a greater impact on their health than the medical care they receive. Social and economic factors have a substantial influence on health. About 80% of a person's health status is attributed to social and economic factors, health-related behaviors, and the physical environment (LeadingAge, 2014).

A study assessed health-related changes of participants in a fall prevention program. The researchers analyzed data from 1,482 older Texans over a two-year period at baseline and postintervention (Smith et al., 2012). Regression models depicted that rural participants, despite entering and exiting the program with lower health status, report greater rates of positive change for falls efficacy and health interference than urban participants. There is a relationship between socioeconomic status and falls. This study showed that there are high rates of gains in fall prevention that can be had by those who start out at a higher poverty rate and lower health status. In this study, Smith et al. (2012) also asserted that higher poverty rates combined with inadequate services and health resources resulted in poor health outcomes. Low-income older adults often live and have lived their entire lives in poor environments, had poor diets, and were unable to access needed health care services. It is important to understand the difficulties faced by low-

income older adults for this particular study, because the program evaluated was implemented at affordable housing communities for elders.

The United States Department of Health and Human Services, Assistant Secretary for Planning and Evaluation, and Office of Disability, Aging and Long-Term Care Policy (2014) conducted a study investigating Medicare and Medicaid use among older adults in publicly subsidized housing in terms of health condition and Medicare and Medicaid utilization. Among HUD-assisted older adults, 63% linked to both Medicare and Medicaid compared to 30% linked to Medicare only, and about 70% of HUD assisted Medicare fee for service beneficiaries who were older adults were dually enrolled compared to only 13% of unassisted Medicare FFS beneficiaries in the community. HUD assisted Medicare and Medicaid enrollees (MMEs) had more chronic conditions than MMEs who were not HUD-assisted. Fifty-five percent of HUD MMEs and 43% of unassisted MMEs had five or more chronic health conditions. This translated to higher health care utilization and costs for assisted older adults. When comparing monthly Medicare payment, the researchers discovered that HUD assisted MME's average Medicare fee for service was 16% higher than unassisted MME's in the community ($1,222 compared to $1,054). The HUD-assisted MME's Medicaid FFS PMPM payment was 32% higher than unassisted MME's (USDHHS et al., 2014). Older adults in affordable housing often are dually eligible for Medicare and Medicaid, so it is important in this thesis to understand the unique challenges for this population as well as the costs associated with worsened health statistics.

Health and Housing Connection

There are multiple reports and studies investigating the connection of housing and health in America. In a review of the housing and health status of older Americans, Engelhardt, Eriksen, and Greenhalgh-Stanley (2013) provided a profile of the near old, individuals aged 55 to 64, and those aged 65 and older. Data was drawn from interviews with about 25,000 Americans in 2010. The authors discussed that with the aging of America, the intersection of housing and health is become increasingly important. The strong complementarity between health and housing at older ages is evident in a variety of ways. First, there was a strong correlation between socioeconomic status and health throughout life. For elders, those individuals who are affected by affordability were also in poorer health. Second, there was a strong desire of older adults to age in place. With time, this could result in older adults with health statuses inadequately matched to their housing, exacerbating poor health. This could exacerbate poor health, including consequences through physical risks, such as falls, or resulting in diminished social interaction resulting in poor emotional and mental health (Engelhardt et al., 2013). These issues supported the fact that efforts to improve the wellbeing of elders should simultaneously incorporate housing and health needs. Over six percent of all older adult renters lived in public or subsidized rental housing. Most of these were non-white, widowed, or high school dropouts. Renters were shown to be in worse health status than homeowners and had a higher number of medical conditions. Research showed a correlation between homeownership and health outcomes, but the most direct linkage for older adults happened through falls. Residences that were of low quality may have

contributed to falls. The probability of falling increased sharply with age, and was highest among renters, widows, and the poor. The likelihood of falling rose as housing quality deteriorated. The percentage of older adults who had fallen in the last two years in poor-quality housing was 54%, compared to 34% for excellent quality housing. The falls were also of greater severity in poor quality housing (Engelhardt et al., 2013). This report showed the disparity experienced by low-income older adults in subpar housing and supported the need for interventions specifically in this population. This research supported the need for this thesis as it highlighted an underserved and disadvantaged population. Although Mercy Housing provides high quality housing with services, many older adults had lived in poor quality housing prior to their current residency or have poor health as a result of health disparities throughout life.

The United States Department of Health and Human Services, Assistant Secretary for Planning and Evaluation, and Office of Disability, Aging and Long-Term Care Policy (2014) investigated Medicare and Medicaid use among older adults in U.S. Department of Housing and Urban Development (HUD)-assisted housing and explored the possibility of publicly subsidized housing serving as a platform for efficient population health management of low-income older adults experiencing various levels of physical and mental health risk. The report determined that a large and growing number of low-income and modest-income older adults faced the challenge of finding affordable and safe housing that could also accommodate aging changes. The 1.3 or 2 million older renters living in publicly subsidized housing experienced increasing difficulty with age,

including physical, cognitive, and emotional health conditions. This report adds to the research supporting the high need of older adults in low income housing.

Upon further investigation of the issue of aging publicly subsidized renters in the United States, Gibler (2003) utilized AHEAD Wave 2 survey to compare housing conditions of elderly subsidized housing renters with unsubsidized tenants. The author determined that older adults in publicly subsidized rental housing experience poorer health, more chronic conditions, and higher independent activities of daily living (IADLs) limitations than unsubsidized renters. The study used a survey to compare the housing conditions of elderly subsidized housing residents to unsubsidized residents. As the ability of older adult with chronic conditions worsened, their health and safety was compromised, leading to health and long-term care costs rising steeply from premature transfers to nursing homes, repeated trips to emergency departments, and frequent hospitalizations. These were often a result of falls. The author argued that although elders in subsidized housing are likely at the appropriate housing level of care, they often do not have access to supportive services allowing them to age in place. This is a problem that needs to be addressed (Gibler, 2003). This study supported the focus on fall prevention services offered within the housing community as a strategy to improve health, quality of life and likelihood of aging in place. Affordable housing provides an opportunity to address falls.

Opportunity to Address Falls

Research has shown that deteriorating health can put vulnerable older adults at risk for falls and impede their ability to age safely and independently in the community.

As many as 40% of community dwelling older adults fall each year. The majority of older adults living in community settings spend a large potion of their time at home, so between one-half and two-thirds of falls and 60% of fatal falls, occur in or around the home (Stevens, 2003). The fall-related burden to the healthcare system will continue to increase unless resources are allocated to provide appropriate interventions for older adults in poverty (World Health Organization, 2007). Integrating housing and healthcare can create opportunities to launch initiatives that lead to improved health, safety, and quality of life for residents, while also reducing healthcare cost (LeadingAge, 2014). Affordable senior housing provides a platform for service delivery focused around health and supportive services. Affordable housing can play a key role in furthering cost-effective solutions to addressing health and quality of life concerns of the increasing population of low-income older adults. Affordable housing can engage aging residents in maintaining their health and independence while remaining safely in their home (Enterprise Community Partners & LeadingAge, 2011).

A report on health in affordable housing by The United States Department of Health and Human Services, Assistant Secretary for Planning and Evaluation, and Office of Disability, Aging and Long-Term Care Policy (2014) showed that in order to address problems related to poor health and low socioeconomic status, many publicly assisted nonprofit housing providers, states, and private organizations have developed enhanced service programs for residents in affordable housing. These properties employed a service coordinator complemented by community partnerships. Programs and services included falls prevention and physical activity (USDHHS et al., 2014). This description of service-

enriched housing described the format of the affordable housing and services as the setting of this thesis.

Another study researched why older adults did not participate in leisure physical activity and strategies to encourage participation. Crombie et al. (2004) conducted a cross-sectional study of sixteen general practices including 409 randomly selected adults 65 and over. The participants lived independently and were interviewed at home. Results included that levels of knowledge about the health benefits of exercise were high, but participation in physical activity was not. Regression modeling identified activity deterrents including lack of interest, lack of transportation, shortness of breath, joint pain, perceived lack of fitness, and lack of energy. The researchers argued that easily accessible facilities can encourage participation in physical activity (Crombie et al., 2004). Affordable housing communities provide a convenient, effective, and efficient manner of fall prevention program delivery.

The health status of low-income older adults in affordable housing, the connection between housing and health, and opportunity to address falls in affordable housing provide a framework for understanding affordable housing and the older adults who live there. This thesis evaluates the effectiveness of a fall prevention program for the specific population of elders living in affordable housing. Fall prevention programs have been developed with the goal to reduce risk and incidence of falls.

Fall Intervention Programs

Falls are not an inevitable part of aging and can be prevented. As a result of research, there has been an increase in fall prevention education programs and a transition

from clinical-based to community-based fall interventions. Fall prevention programs have reduced falls and fall-related injuries among high-risk populations using multi-faceted approaches including education, exercise, environmental modification, and medical review (CDC, 2015). Through education of fall risk and engagement in fall prevention programs, older adults can effectively reduce their risk for and incidence of falls. Fall prevention programs are an opportunity for older adults to engage with other older adults, learn about fall risk reduction, and realize and address their own personal beliefs and practices that increase chances of falling and lower quality of life.

A Matter of Balance is a fall prevention program that has been widely implemented and proven effective in reducing fall risk and increasing activity among older adults. Fall prevention programs such as this one incorporate the Stages of Change theory to facilitate behavior change to mitigate fall risk among older adult participants (Prochaska & DiClemente, 2005 & Sleet et al., 2010). *A Matter of Balance* program has been offered at various Mercy Housing affordable senior sites in California. Affordable housing provides an accessible and effective platform for service delivery (LeadingAge, 2014). The effectiveness of existing fall prevention programs among specific segments of older adults needs careful evaluation (CDC, 2015). There is a need to evaluate fall prevention programs for older adults 65 and older living in community.

The contents of this section report on fall prevention program best practices, program development and the *A Matter of Balance* Program. The following subheadings include Multicomponent Interventions, Key Program Components, Importance of Fall

Prevention Programs, Development of Falls Prevention Programs, and specific information about the *A Matter of Balance* Program.

Multicomponent Interventions

Research has shown that falls are frequently caused by interactions among biological, behavioral, and environmental factors (Stevens, 2005). The majority of falls and injuries related to falls are caused by multiple risk factors, many of which can be eliminated or adjusted with interventions (Josephson et al., 1991). Therefore, multicomponent interventions would effectively address risk factors for falls among elderly living in the community.

In a comprehensive review of literature researching fall prevention strategies, Stevens (2005) determined that to provide effective fall prevention, interventions may include the following components: risk factor screening, exercise or therapy to improve gait, balance, and strength, medication management, education about fall risk, referrals to health providers for chronic conditions that may contribute to falls, and vision assessment and correction. Multi-component interventions should be designed to the specific population characteristics. For community-dwelling older adults, fall interventions should include gait training, exercise, medication review, postural hypotension treatment, reducing home hazards, and treating cardiovascular disorders (Stevens, 2005). This study supported the inclusion of a variety of interventions with the *A Matter of Balance* program to work with older adults to effectively mitigate their fall risk.

In another study, the author reviewed literature on addressing the issue of falls, and determined there were a variety of effective interventions. In a systematic review and

analysis of randomized clinical trials, Chang et al. (2004) reviewed 40 studies of older adults to assess the effectiveness of interventions to prevent falls. Data extracted from Medline, HealthSTAR, the Cochrane Library and other health databases included various fall interventions: multifactorial fall risk assessment with management program, exercise, environmental modification, or education. The researchers determined that interventions to prevent falls in older adults are effective in reducing both the risk of falling and the monthly rate of falling. Various strategies have been identified to address modifiable risk factors for falls. Interventions include those that target environmental, behavioral, and biological risk. The authors concluded that the most effective prevention strategies involve multidimensional fall risk assessment and management program targeting multiple modifiable risks at once. (Chang et al., 2004). This study supported that these various intervention strategies should be integrated into fall prevention programs for the most effective means of fall prevention for older adults as was done in *A Matter of Balance.*

As described in the Stages of Change theory, behavior change is difficult to achieve for older adults. Some adults may be more likely to address one risky behavior than another. Within one lesson of the program, the facilitators lead the participants through an activity identifying their personal risks and what interventions would be most effective (Sleet et al., 2010). Because these are often numerous, the leaders then conduct an activity where the participants rate each problem behavior in order of riskiest and most likely to lead to a fall. During this is when participants focus on the Contemplative to Preparation stage as they prepare to take action in changing behavior (Prochaska &

DiClemente, 2005). The studies above support multicomponent falls interventions, but within this program type, there are key components that increase its effectiveness.

Key Program Components: Messaging, Implementation, and Evaluation

Researchers have proved that a fall prevention program necessitates careful messaging, implementation, and evaluation in order to be effective and successfully reduce incidence and risk of falls. In determining program components and emphasis, it is crucial to incorporate the Stages of Change theory. The Stages of Change theory is useful when working with individuals to adopt improved behaviors and mitigate fall risk as well as when structuring and implementing a fall prevention program (Sleet et al., 2010). A decrease in injury and injury risk is extremely rare without behavior change. Behavior change is crucial in a decrease in injuries and risk of injury (Sleet et al., 2008). The key program components include messaging, implementation, and evaluation.

Messaging. Through analyzing fall prevention program literature, it was evident that messaging is important in recruiting and engaging participants. Hughes et al. (2008) evaluated elders' perceptions of fall risk and determined implications for fall-prevention campaigns. The authors utilized data from telephone surveys in 2002 with Australians 60 years and older. The participants included intervention (who received a fall prevention program), comparison, and focus groups. Theses conclusions included that fall prevention campaigns have focused on two primary messages: falls are a significant health issue for older adults and falls are preventable. These are used to counter the common misconceptions about falls not being preventable or are only an issue for frail individuals. For many older adults, this lacks a message that is personally relatable, and is

an important barrier to fall prevention. Focusing on fall prevention strategies, such as physical activity, with a focus on health and independence may be more beneficial. Some older adults viewed traditional fall prevention messages as detrimental because they exacerbated fear. Independence has been identified as highly valuable for older adults, which makes it a positive focus for fall programming and behavior change (Hughes et al., 2008). This study supported that messaging is crucial within falls prevention programs.

Another study focused on messaging was conducting through a thorough review of perceptions, beliefs, and behaviors. Stevens et al. (2010) investigated additional factors that facilitate reducing fall risk through behavior change. These include social support, low-intensity exercise, and a perception of relevancy. Barriers to adoption of fall interventions include fatalism, risk denial, poor self-efficacy, and no history of exercise. Participation and risk reduction can be encouraged through presenting fall prevention as lifestyle enhancing and a way to retain independence (Stevens et al., 2010).

Messaging within a program focused on behavior change is specifically important and supported by the Stages of Change theory. Interventions require messaging that will help the individual move from Precontemplation to Contemplation through becoming aware of the causes, consequences, and solutions to their problem. The messaging needs to incite realistic and open self-reflection as well as encourage and motivate the individual to develop a sense of self-efficacy and self-confidence (Prochaska & DiClemente, 2005). Messaging is an important component of fall prevention programs as well as implementation.

Implementation. Implementation is a key program component because it sets the tone for the entire program and can effect the overall effectiveness of the program. In a comprehensive literature review of perceptions, beliefs, and behaviors around falls, Stevens et al. (2010) asserted that the implementation of a falls prevention program is crucial to its success. The author recommended that participants have to be engaged to begin and complete the program, as well as for the program to have sustained impact on participants. A first step is creating public awareness. Increasing awareness about fall misconceptions and risk factors, the importance of fall prevention, fall prevention resources, fall risk assessment, and the program information and schedule. This step aligns with the Stages of Change theory in that awareness of personal risk is the necessary component for an individual to move from Precontemplative to Contemplative Stage (Prochaska & DiClemente, 2005). The message should focus on helping older adults maintain independence, safety, quality of life, and health. Recruitment strategies include social events, attractive incentive, and word of mouth by older adults to promote the program (Centers for Disease Control and Prevention, 2015). A Matter of Balance utilized these implementation strategies to recruit participants and increase awareness of fall risk and impacts. The final crucial program component is evaluation.

Evaluation. Fall prevention programs need to be evaluated to determine their effectiveness. It is particularly important to evaluate programs among specific groups of older adults to determine effectiveness for a variety of populations (Stevens & Olson, 2000). Each subgroup has unique behavioral, environmental, and physical health characteristics. These should be considered when planning and implementing falls

prevention interventions so that it can be ensured that prevention efforts are effective across a broad range of populations in community settings (Smith et al., 2012). This thesis sought to evaluate the fall prevention program delivered to a specific population of low-income older adults in affordable housing.

In a comprehensive literature review of older adult fall prevention, Stevens et al. (2010) noted that when delivering a program, it is essential to properly evaluate it. There should be a quality assurance plan to measure fidelity to the program and evaluate program quality. Fidelity describes the extent to which the program is consistently delivered according to the program developer's intent. It is essential to ensure that participants receive its intended benefits. Quality evaluation includes that expectations are followed, including completing a pre-survey, program schedule, and evaluations. It also evaluates leader effectiveness in delivering the program based on participants' engagement and interest (Stevens et al., 2010). Evaluation within *A Matter of Balance* is completed by surveys at baseline and program completion. This thesis also evaluated the program effectiveness in a six-month follow-up survey.

Another study was used to identify factors associated with program completion of a falls prevention program, because fall prevention programs may help avoid fall issues if completed. Batra, Page, Melchior, Seff, Vieira, and Palmer (2013) conducted an evaluation of a community-based falls prevention program in an effort to understand factors associated with program completion. The study included 3,420 older adults in South Florida receiving the *A Matter of Balance* program (eight, two-hour sessions to reduce fear of falling and increase activity levels). Through demographic and pre and

post surveys, the researchers used logistic regression to identify factors associated with program completion. Females were more likely to complete the program. The authors concluded that awareness of completion barriers can help to increase benefits and cost effectiveness of the program as well as lower the attrition rate. Future research needs to explore why certain groups had a higher likelihood of completing either program. (Batra et al., 2013). This study identified completion factors, which assist in the evaluation of programs and point to the need for additional program implementation and evaluation.

Fall prevention programs help decrease the risk of falling. However, regardless of being effective, an intervention program with low adherence and few completers has poor outcomes. The Centers for Disease Control and Prevention created a guide to implementing effective community-based fall prevention programs. In this guide, the authors noted that attrition by participants can negatively impact a health promotion program by decreasing continued attendance of the group, reducing participant benefit attainable by attending the minimum required sessions and resulting in biased outcomes and wasted resources. In order to achieve maximum benefit from the program, participants need to attend a minimum obligatory number of sessions (CDC, 2015). Organizations need effective measures to show whether a program is benefiting participants. Evaluation helps to demonstrate a program's value. It shows the benefit to older adults and cost-effectiveness. It can also prove to funding agencies that a program is a worthwhile investment and attract partners and funders through outcomes with data (CDC, 2015). Evaluation serves the individuals and agencies implementing fall prevention programs in determining their effectiveness as an intervention.

The research highlighted in this section supports this thesis, because there is a need for in depth analysis of fall prevention programs. This thesis performed measures at baseline, program completion, and six-month follow-up to ensure results go beyond immediately after program completion. Research also supports that there is a need to focus on interventions with specific subgroups, such as low income older adults in affordable housing as is achieved through this thesis. The importance of fall prevention programs further supports the need for its implementation at a variety of locations and with a variety of populations.

Importance of Fall Prevention Programs

The beginning of this literature review confirmed that falls and fall-related injuries cause an enormous burden to individuals, society, and the healthcare system. With the aging United States population, this problem will increase unless preventative action is taken. Falls can be prevented. Stevens (2005) wrote there is a need to refine, promote, and implement effective interventions.

Fall prevention programs are an effective intervention to falls. Rubenstein and Josephson (2006) conducted a comprehensive literature review of evidence focused on falls and their prevention in the elderly. Because a large portion of accidental injuries is preventable, the authors asserted that vigorous prevention is appropriate for older adults who fall or are at risk of falling (Rubenstein & Josephson, 2006). This study supported the importance of implementing fall prevention programs as a strategy in fall reduction.

Fall prevention programs have been proven to be effective interventions for fall risk and costs. Stevens, Mack, Paulozzi, and Ballesteros (2008) conducted a special

report from the Centers for Disease Control and Prevention on self-reported falls and fall-related injuries among adults 65 and over in the United States. The authors sought to estimate the percentage of older adults who fell during the previous three months by analyzing data from the 2006 Behavioral Risk Factor Surveillance System survey. Results included that about 5.8 million, or 15.9%, of individuals 65 and over fell in the preceding three months, and 1.8 million, or 31.3% of those who fell sustained an injury resulting in a doctor visit or restricted activity. Programs can appreciably decrease the incidence of falls and health care costs of fall injuries as well as improve the quality of life for older adults (Stevens et al., 2008). This study further supported fall prevention programs as interventions to reduce risk of falling and costs associated with falls as well as this thesis' focus on evaluation of a fall prevention program.

Additional research analyzed the cost-benefit analysis of older adult fall prevention interventions in a special report from the Centers for Disease Control and Prevention. The purpose was to identify community-based fall intervention programs that were feasible, effective, and provided a positive return on investment. Carande-Kulis, Stevens, Florence, Beattie, and Arias (2005) utilized a third-party payer perspective to determine the costs and benefits of three effective fall interventions. Intervention effectiveness was based on randomized controlled trials and national data were used to estimate the average annual benefits from averting the direct medical cost of a fall. For each of the programs, the net benefit and return on investment were estimated. Results included that each of the program provided positive net benefits. The analysis of the return on investment showed that benefits covered implementation costs as well as

exceeding direct program delivery costs (Carande-Kulis et al., 2005). The aging population makes it critical that prevention programs that are practical and effective are developed and implemented. These results further rationalized the need for and benefit of fall interventions for older adults. The cost-benefit analysis also supported its implementation at community-based organizations such as in this thesis.

Another study focused on the injury problem among older adults in terms of costs was the result of a partnership between the Journal of Safety Research and the Centers for Disease Control and Prevention. The authors, Dellinger and Stevens (2006), researched the injury problem among older adults in terms of cots and mortality. The source for death and nonfatal injury data was the CDC Web-based Injury Statistics Query and Reporting System (WISQARS). Fall incidence data were obtained from the 2000 Health Care Utilization Program National Inpatient Sample (NIS) and the 1999 Medical Expenditure Panel Survey (MEPS). The researchers utilized a case-crossover design to measure monthly fall-related medical care costs. The study findings include that falls are a serious health burden for older adults. The authors concluded that although this is a serious threat for older adults, falls are preventable and progress in reducing falls would greatly impact the high injury rate caused by falls. These programs should be put into practice in communities. The researchers concluded that through implementing effective intervention strategies, there could be a considerably decrease in the incidence of fall injuries, improve the health and quality of life of older adults, and significantly reduce healthcare costs (Dellinger & Stevens, 2006).

This literature review section established the importance of fall prevention programs. These programs need to be implemented within communities to reach older adults. Interventions help decrease this risk for older adults as well as decrease the cost burden on health care systems and society. These results supported the implementation of *A Matter of Balance* across Sacramento affordable housing sites within Mercy Housing, which is evaluated through this thesis.

Development of Falls Prevention Programs

Since 1990, fall prevention interventions for community-dwelling older adults have rapidly developed. In 2009, Gillespie et al. conducted a randomized trial of interventions including 111 trial studies, and 55,303 participants, on fall interventions for community-dwelling older adults. Of the interventions of exercise (multiple-component group exercise, Tai Chi, and individual multiple-component home based-exercise), fall risk assessment, Vitamin D, home safety interventions, gradual withdrawal of psychotropic medication, and pacemakers, the researchers determined that exercise, especially multiple-component group exercise, reduced both rate of falls and risk of falling. Multiple-component exercise programs contain two or more of the following components: strength, balance, flexibility, or endurance. The authors substantiated the effectiveness of group exercise programs.

Initially, individual exercise programs delivered by health professionals were among the first strategies proven to decrease falls. Robitaille et al. (2012) performed a study among community-dwelling elders examining the effect of a fall prevention program offered under real-world conditions. The investigators focused on balance

maintenance and the program's impact on falls. This research was a quasi-experimental study including ten community-based organizations and 200 participants and utilized pre and post- measures on balance performance and self-reported falls. Through linear regression to evaluate balance and negative binomial regression to evaluate falls, the researchers found that improvements in balance can be maintained twelve months after the program's conclusion. This supported the inclusion of exercise and balance components in fall prevention program. The researchers concluded that structured group exercise programs offered in community-based settings can maintain factors of balance for several months after program conclusion. Originally, group exercise interventions were of unknown effectiveness. This is a significant development because exercise programs can reach larger numbers of people lower costs than individual interventions (Robitaille et al., 2012). Many fall prevention programs have developed in recent years, including *A Matter of Balance.*

A Matter of Balance

A Matter of Balance is an intervention intended to reduce fear of falling and promote activity for older adults. It was developed by Boston University, and is administered by the Partnership for Healthy Aging, which is a public-private partnership dedicated to linking medical professionals, evidence-based programs, and community services. The program was based on the theory that minimizing risk factors and improving strength and balance would increase older adult confidence to decrease fall vulnerability (CMMS, 2009). The program incorporated behavior education focused on risky behaviors, environmental hazards, and strength and balance exercises. Each of the

eight sessions focused on an educational topic and the exercise component begins in the third session and at the beginning of each subsequent session (Chen, Edwards, & Janke, 2015)

A Matter of Balance was first evaluated by Tennstedt et al. (1998) who documented positive outcomes of the program. The researchers conducted a randomized, single-blind controlled study that evaluated *A Matter of Balance*. The test included 434 individuals aged sixty and older from forty senior housing sites in Boston who reported fear of falling. A randomized, single-blind controlled trial was conducted to test the efficacy of a community-based group intervention to reduce fear of falling and associated restrictions in activity levels among older adults. Data were collected at baseline, and at six-week, six-month, and twelve-month follow-ups. The intervention subjects reported increased levels of intended activity and greater mobility control after the intervention. Sustained impacts at the 12-month follow-up included improved social function and mobility range. The intervention had immediate but modest beneficial effects that diminished over time in the setting with no booster intervention. The program was described as a cognitive-behavioral intervention program. It was intended to reduce fear of falling by increasing self-efficacy and sense of control over falling. This goal was achieved by the following tactics: restricting misconceptions to promote falling and fear of falling as controllable, goal setting to increase activity levels, altering the physical environment to reduce risk of falling, and increase physical activity. Tennstedt et al. (1998) described that the principal aim of the program was to reduce fear of falling and the secondary aim was to increase physical and social ability and activity. The author

noted the difference in *A Matter of Balance* as compared to prior interventions is that it focuses on reducing the fear of falling and related activity restrictions (Tennstedt et al., 1998). *A Matter of Balance* as a cognitive behavioral intervention program aligns with the Stages of Change theory. This theory outlines that behavior change needs to encourage self-efficacy and sense of control over oneself, and in this case falling. The same strategies used in this program are emphasized as necessary in Stages of Change for an individual to move from one stage to the other. These include goal setting, self efficacy, and action to change behaviors (Prochaska & DiClemente, 2005). This study documented the positive impacts of *A Matter of Balance*, used to support its implementation at sites evaluated by this thesis.

Another study of *A Matter of Balance* described the transfer of the program as professional to volunteer led. Smith et al. (2012) described that *A Matter of Balance* was translated into *A Matter of Balance/ Volunteer Lay Leader Model.* The study assessed health-related changes of participants of the program. The researchers analyzed data from 1,482 older Texans over a two-year period at baseline and postintervention. Results included that participants significantly increased falls efficacy, reduced activity interference, and decreased the number of days limited from usual activity. This study demonstrated that the Volunteer Lay Leader Model enabled that the program be delivered successfully through a volunteer as opposed to the original professionally delivered program. The leaders served as facilitators and used a detailed training guide and instructional videos to teach the class. Smith et al. (2012) wrote that the program was unique because it focused on both changing attitudes and behaviors causing falls. The

authors provided a description of the program progression. The beginning sessions focused on fear of falling and the perception of falls as preventable. Subsequent classes focused on environmental modification and strength and balance exercises. The goal of the program was adaption of greater perceived control, confidence, and realistic self-perception (Smith et al., 2012). These focuses of the program aligned with messaging emphasized in Stages of Change, including a focus on changing attitudes and behaviors, adaption of greater perceived self- control, confidence, and self-perception (Prochaska & DiClemente, 2005). This study supported the implementation of the thesis program as a lay leader led model. In addition to evaluating if the lay leader model can be successful, there is also a need to evaluate if the program is effective in real-world settings.

Another study reported a history of the development of falls prevention programs. Batra et al. (2013) conducted an evaluation of *A Matter of Balance* to understand factors associated with program completion. The authors described that in the late 1980s, the need for and importance of fall prevention programs were recognized. In the time since, several programs have been designed. Most interventions were randomized control trials, and found that these were effective interventions. However, they were rarely dispersed to community settings. There was a need to evaluate if the programs could be effective in real world settings. This brought a change to programs implemented in community settings and facilitated by lay leaders. Lay leaders increased program adherence, decreased delivery costs, and reached higher numbers of people (Batra et al., 2013). The program evaluated in this thesis is implemented in real-world settings and in the lay

leader model described in this study. Even though the effectiveness of this model has been documented, there remain both challenges and successes in its implementation.

An additional study chronicled the progression of *A Matter of Balance* and its challenges and successes as a lay leader model. Haynes, League, and Neault (2014) authored an article to provide commentary about the program. In the 1990s *A Matter of Balance* was developed at Boston University's Roybal Center for Enhancement of Late-Life Function as a way to increase activity engagement and decrease fall risks. It was a small group health promotion program led by a variety of health professionals. The randomized clinical trial identified noteworthy improvements in falls management, falls self-efficacy, falls control, increased activity, and reduced social isolation. However, the use of professionals as leaders made the program costly and unsustainable. The volunteer lay leader was developed to increase reach of the program to older adults in the community. The Partnership for Healthy Aging adapted the program, and has trained over 900 Master Trainers in 38 states. The Master Trainers then teach volunteer lay leaders the program. A professional visits one class to demonstrate how to get up from a fall and address participant concerns. Each participant receives a program workbook. This report showed that in 7 years, the lay leader model has reached over 45,000 older adults in the United States. The authors argued that the lay leader model also promotes embedding the program in community organizations resulting in it being more available to older adults in a wide array of settings. The lay leader model enabled organizations to bring evidence-based programming to the community. Organizations, including aging service providers, health departments, trauma departments, universities, and housing,

received the benefit of new collaboration and strengthened community partnerships as well as reaching independent older adults. The report concluded with the authors asserting that it was imperative that *A Matter of Balance* continues to reach older adults living in the community for improved quality of life and independence (Haynes et al., 2014). This thesis evaluates the program reaching more groups of older adults.

This section describing *A Matter of Balance* depicted that the program aligned with the Stages of Change theory. Similar messaging included a focus on changing attitudes and behaviors, goal setting, adaption of greater perceived self-control, self-confidence, self-efficacy, and self-perception. These are the same strategies emphasized as necessary in Stages of Change for an individual to move from one stage to the other (Prochaska & DiClemente, 2005).

This section also described the effectiveness of *A Matter of Balance* throughout its progression, including volunteer led and in real world settings. The program evaluated in this thesis is implemented in real-world settings and in the lay leader model as described in this study. There is a need to further understand *A Matter of Balance* outcomes and evaluation.

A Matter of Balance Research and Evaluation. Numerous research articles chronicle the effectiveness and impact of *A Matter of Balance* for community-dwelling older adults. In 1998, Tennstedt et al. conducted a randomized, single blind controlled trial to examine the effectiveness of a community based group intervention, *A Matter of Balance*, to reduce fear of falling and increase activity levels of older adults. A sample of 434 individuals 60 years and above was recruited from senior housing sites in the Boston

area. The intervention participants had increased levels of activity and mobility control following the intervention. Twelve months after the program, they reported improved social involvement and mobility. Tennstedt et al., (1998) emphasized that this program was not designed specifically to reduce falls. It was developed to decrease activity restriction, which was associated with loss of physical function and might reduce risk of falls. This study did not result in any reduction in the number of falls for the intervention versus control group. The authors concluded that this could be understood as the intervention not being effective on fall or fall risk reduction, but argued that if the participants had increased activity levels, this could potentially increase risk of falling. This implied that the fact that the fall incidence was not greater than the control group, perhaps there are other impacts of the intervention that successfully reduce fall risk. The study determined that short-term changes could be achieved in negative attitudes and beliefs about falls and activity levels. Results were improvements in confidence of daily activities and management of falls (Tennstedt et al., 1998).

In a later study examining *A Matter of Balance*, Healy, Peng, Haynes, McMahon, Botler, and Gross (2008) explored if the cognitive behavioral program, *A Matter of Balance*, found to be effective in a previous randomized clinical trial could be converted into a community-based volunteer lay leader model and accomplish outcomes similar to those found in the previous study. The researchers utilized a repeated-measures, single-group design. Measures of falls efficacy, falls management, and fall control were evaluated at six weeks, six months, and twelve months. Each measure had significant increases at the measure points. This modification of the professionally led program into

a volunteer lay-leader model enabled that the program be integrated into community based organizations and reach more older adults in a variety of settings (Healy et al., 2008). This translation to a lay leader model enabled the program evaluated in this thesis to be implemented at affordable housing communities. Effectiveness of programs is crucial to evaluate, but the financial benefits are also important for programs to understand. This study also informed the author's approach to methodology and program evaluation for this thesis.

The Centers for Medicare and Medicaid Services published a report in 2009 evaluating community-based wellness and prevention programs within the Affordable Care Act. They reported that participation in *A Matter of Balance* was correlated with medical cost savings of $938 total medical costs per year. This is made up of reductions of $517 in unplanned hospitalization, $234 in skilled nursing facility, and $81 in home health care. The investigation also found that participation was associated with unplanned hospitalization reduction of .05 per person annually. This indicates that one unplanned hospitalization was prevented for every 20 MOB participants (CMMS, 2009). This study supported the continued implementation of the program to reach older adults in the community.

In a 2012 study assessing the health changes of *A Matter of Balance/ Volunteer Lay Leader* model program, Smith et al. specifically observed the program impact based on residential location. The study assessed health-related changes of participants of the program. The researchers analyzed data from 1,482 older Texans over a two-year period at baseline and postintervention. Results included that participants significantly increased

falls efficacy, reduced activity interference, and decreased the number of days limited from usual activity. The data examined showed that participants significantly increased fall efficacy, reduced activity interference due to health, and decreased the number of days limited from usual activity. Regression models depicted that rural participants, despite entering and exiting the program with lower health status, report greater rates of positive change for falls efficacy and health interference than urban participants. There is a relationship between socioeconomic status and falls. This study showed that there are high rates of gains in fall prevention that can be had by those who start out at a higher poverty rate and lower health status. In this study, Smith et al. (2012) also asserted that higher poverty rates combined with inadequate services and health resources resulted in poor health outcomes. Low-income older adults often live and have lived their entire lives in poor environments, had poor diets, and were unable to access needed health care services (WHO, 2008). It is important to understand the difficulties faced by low-income older adults for this particular study, because the program evaluated was implemented at affordable housing communities for elders.

Another study evaluated program effectiveness of A Matter of Balance, specifically as a lay leader model. In 2012, Batra et al. evaluated the effectiveness of the lay leader model of the *A Matter of Balance* program in the first year of their implementation in South Florida and further reported on participant outcome measures. The program was offered between October 2008 and December 2009 and participants were 60 years and older. Participants completed a baseline and posttest survey to measure falls management, social activity, and exercise, which were measured using a general

linear model. They also completed a class evaluation. Results showed significant improvement on six of the seven questions and indicated that the program was effective, beneficial, and well-organized. The authors concluded that lay leaders successfully implemented the program in community settings, and the program was effective in reducing fear of falling. The results suggest that community organizations were able to successfully implement the program and achieve desired outcomes (Batra et al., 2012). This study supported the implementation of the program at the sites evaluated in this thesis as well as informing methodology used in this thesis.

Another study further investigated the effectiveness of the program. Chen et al. (2015) evaluated the effects of *A Matter of Balance* on falls and physical risk factors of falling among community-dwelling older adults in Florida. The study consisted of 110 adults separated into intervention and control groups on this prospective cohort study. Data on falls, risk of falling, and additional fall risk factors were collected at baseline and at program completion. The researchers used multivariate analysis of covariance with repeated measure and logistic regressions to analyze program effectiveness. The results included that *A Matter of Balance* participants were less likely to have fallen and had significant improvements in risk of falling compared to the comparison group. The study supported continued and more widespread use of the program to reduce falls and the risk of falling for older adults. This recommendation supported the implementation of the program at communities studied in this thesis.

The fall intervention program section provided a background on the recommendations for fall prevention interventions, the development of these programs,

and specific in-depth analysis of the development of, and effectiveness of *A Matter of Balance* fall prevention program. The knowledge provided by this section is vital to understanding the thesis research. The importance of evaluating fall programs in a variety of community settings as well as for specific populations was highlighted. This thesis focuses on *A Matter of Balance* implemented at affordable housing sites for low-income elders. The incorporation of the Stages of Change Theory in program development was highlighted as being of substantial importance. Also, a comprehension of the development of *A Matter of Balance* and research investigating effectiveness in a variety of settings supports this research approach and the need for additional research of the program in a variety of settings.

Conclusion

Falls and fear of falling are a significant and growing problem for older adults, society, and the healthcare system. They threaten older adults' health, wellbeing, and independence and generate enormous financial burden. As the number of older adults increases, the number of fall-related injuries and fatalities will also increase. Falls are not an inevitable part of aging and can be prevented. As a result of research, there has been an increase in fall prevention education programs and a transition from clinical-based to community-based fall interventions. Fall prevention programs can substantially reduce the number of falls. Through education of fall risk and engagement in fall prevention programs, older adults can effectively reduce their risk and incidence of falls.

With support from the literature review, falls have been proven to be a critical issue for older adults, causing physical, psychological, emotional, and financial hardship.

Multiple studies have highlighted the effectiveness in multi-component falls prevention programs, including *A Matter of Balance*, at lowering fall risk and incidence among community dwelling older adults. There has been an emphasis on program evaluation implemented in community settings and with specific groups, such as low-income older adults.

The Stages of Change theory is important to integrate into fall prevention efforts. For an older adult to adopt a fall risk mitigating behavior, movement from one stage to the next is necessary (Sleet et al., 2010). Knowing that older adults may be hesitant to incorporate fall prevention strategies and that a substantial proportion are afraid of falling are important factors to incorporate when designing community fall prevention programs (Boyd & Stevens, 2009). Fall prevention programs focus on risk reduction and behavior change. Changing beliefs, attitudes, and self-efficacy are required prior to attempting changes in actual behavior.

This literature review supports that fall prevention programs are an opportunity for older adults to engage in learning and support with other older adults, learn about fall risk reduction, and realize and address their own personal beliefs and practices that increase chances of falling and lower quality of life, and proves a need for more evaluation of implemented fall prevention programs among various groups. This need for evaluation of falls prevention programs for various groups supports the need for this research project which specifically evaluates the fall prevention programs in affordable housing settings. Chapter three is the methodology of the research. It reviews program

purpose, explains research design, describes the population and setting, and reports data collection and analysis.

CHAPTER 3

METHODOLOGY

Introduction

Falls present a significant threat to older adults, especially community-dwelling elders who are low-income (Li et al., 2013 & Stevens, 2003). Therefore, *A Matter of Balance* was implemented at affordable housing senior communities to reduce risk and incidence of falling. Evaluation of the program is crucial in order to assess its effectiveness (Stevens et al., 2012). The purpose of this study was to evaluate if the participants at three affordable housing communities have demonstrated significant and sustained improvements in their level of falls management, level of exercise, and social limitations with regard to concern about falling. In this program evaluation, the researcher sought to determine if participation in *A Matter of Balance* increased levels of fall management, increased physical activity, and decreased social limitations with regards to fear of falling, as well as if these gains in reducing incidence of and fear of falling were maintained after program conclusion. For this study, the author investigated the following research questions:

1. Does participation in *A Matter of Balance* increase levels of fall management?
2. Does participation in *A Matter of Balance* increase physical activity?
3. Does participation in *A Matter of Balance* decrease social limitations with regards to fear of falling?
4. Can these gains in reducing risk of falling be maintained after program conclusion?

Research Design/ Approach

This program evaluation followed a repeated-measures, single-group design. The research analysis utilized retrospective and prospective approach. The retrospective data originated from *A Matter of Balance* program held between June 2015 and September 2015 at Mercy Housing Sacramento area affordable senior communities. Only participants who attended at least five out of the eight *A Matter of Balance* sessions and completed all data measurements were included in this study (Tennstedt et al., 1998). The retrospective data include a baseline conducted before the start of the program and post-survey and class evaluation completed immediately after the last session. The prospective, or follow-up data, included the post-survey and class evaluation and was collected six months after the conclusion of the program.

Population and Setting: Sample Population

A Matter of Balance intends to reach community-dwelling older adults over the age of 60 who had concerns about falls (Batra et al., 2013). The programs evaluated were offered at three of the Sacramento area Mercy Housing senior affordable housing communities. The properties are located in Sacramento County, El Dorado County, and Placer County. Each property had similar qualification requirements regarding age and low-income status. The minimum age at each property ranged 55 to 62. The income guidelines required that the individuals had no more than 30% to 50% of the Area Median Income. All residents were considered extremely low-income to very low-income (Bates, 2015). All residents of the community received a flyer with program

description and information. The programs were held in the community center at each property, so it was conveniently accessible to those living in the community.

Sampling/ Collection and Tabulation of Data

For the retrospective data, the author accessed previous surveys completed by program leaders and participants from affordable senior communities with consent from Mercy Housing. The Attendance form (Appendix C) indicated attendance for individuals throughout the program. A self-reported form completed by participants included the First Session Survey (Appendix D), which was completed the first day of the program before the session began. At the conclusion of the last session, participants completed a Last Session Survey (Appendix E). The questions were the same fall-related questions as the First Session Survey. In addition, participants were asked to complete a Class Evaluation (Appendix F).

For the prospective data, as a follow-up to determine if the intervention effectiveness had been sustained, the author, with permission to use the *A Matter of Balance* survey materials (Appendix G), resurveyed program participants with the Last Session Survey (Appendix E) and Class Evaluation (Appendix F) six months after program completion. First, the investigator introduced the research to participants and explained informed consent. The informed consent form (Appendix B) was passed out to each participant and collected with signatures prior to executing the surveys. The investigator then distributed the Last Session Survey (Appendix E) and *A Matter of Balance* Class Evaluation (Appendix F) to each participant for completion. The investigator was present for any questions. The participants were instructed to place their

survey face down, and the investigator then collected the surveys immediately putting them into a folder to be kept confidential. Through collecting the data again at a later date, it enabled the author to evaluate if any fall risk reduction behaviors developed during the program have been sustained up to six months after program conclusion.

Instruments

Instruments used to collect data include an Attendance sheet (Appendix C), First Session Survey (Appendix D), Last Session Survey (Appendix E), and Class Evaluation (Appendix F). The Attendance form (Appendix C) indicated attendance for individuals throughout the program. The First Session Survey (Appendix D) provided basic demographic information about the participant including age, sex, and race, and additional information related to falls, limited social interaction because of fear of falling, and exercise. The Last Session Survey (Appendix E) included fall-related questions about falls management, fear of falling, and exercise as the First Session Survey.

The First and Last Session Surveys (Appendices D and E) measured falls management, physical activity, and social limitation. Falls management was measured by responding on a Likert-type scale. Participants responded *very sure, sure, somewhat sure, or not at all sure* to the following statements*: I can find a way to get up if I fall; I can find a way to reduce falls; I can protect myself if I fall; I can increase my physical strength; and I can become more steady on my feet*. Higher scores indicate confidence that the participant can reduce fall risk and indicate greater falls management. Social activity limitation due to fear of falling was answered by the question: *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? Lastly, the participant indicated how much exercise was performed currently. They chose one of the following statements to accurately represent their walking and exercising levels: *I do not exercise or walk regularly now, and I do not intend to start; I do not exercise or walk regularly, but I have been thinking of starting; I am trying to start to exercise or walk; I have exercised or walked infrequently for over a month; I am doing moderate exercise less than three times per week; or I have been doing moderate exercise three or more times per week.* The Class Evaluation (Appendix F) included feedback on leader preparedness and class organization as well as questions focusing on talking to others about fear of falling, mitigating risk through environmental modification, and increasing exercise.

Data Analysis/ Procedures

The purpose of this study was to evaluate if the participants demonstrated significant and sustained improvements in their level of falls management, level of exercise, and social limitations with regard to concern about falling. Data from participant surveys were collected and analyzed in an Excel spreadsheet. Impacts were measured using a repeated-measures, one group design to assess immediate and sustained impacts. Data from program participants from June 2015 to September 2015 were included in study analysis. Data were collected at baseline, post program (eight weeks), and six months. Only participants who completed at least five sessions and all surveys were included in the study. Twenty-seven older adults participated in AMOB program during the designated timeline. Of those, twenty-four completed five sessions and all

surveys. Of the completers, 100% (24 out of 24) completed the six-month follow-up surveys.

Demographics of participants were summarized using descriptive statistics. Demographic information, including age, sex, number of people in household, zip code, and race, was collected from all participants in the post survey.

Data were analyzed to answer each research question. Falls management was measured by responding on a Likert-type scale. Higher scores indicate confidence that the participant can reduce fall risk and indicate greater falls management. Social activity limitation due to fear of falling was answered by the question: *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?* Lastly, the participant indicated how much exercise was performed currently. Impacts for the measures were analyzed using mean score changes and Chi-Square analysis. The analyses was used to assess the difference between baseline and posttest surveys and posttest and follow-up surveys across outcome measures for statistical significance.

Conclusion

The evaluation of *A Matter of Balance* at three affordable housing communities focused on four fall-risk related research questions to assess the immediate and long-term effectiveness of the program in reducing risk of falling for older adults. The author analyzed data through surveys using a repeated-measures, single group design. The

purpose of the study was to determine if the participants demonstrated significant and sustained improvements in their levels of falls management, physical activity, and social limitations with regard to fear of falling. Chapter four provides an analysis of this study's data, results, and discussion.

CHAPTER 4

ANALYSIS OF DATA, RESULTS, AND DISCUSSION

Introduction

Falls present a significant threat to older adults, especially community-dwelling elders who are low-income (Engelhardt et al., 2013, Gibler, 2003, & Stevens, 2003). Therefore, *A Matter of Balance* was implemented at affordable housing senior communities to reduce risk and incidence of falling. As with any program, evaluation is crucial in order to assess its effectiveness and make any needed changes. The purpose of this study was to evaluate if the participants at three affordable housing communities demonstrated significant and sustained improvements in their level of falls management, level of exercise, and social limitations with regard to concern about falling. This program evaluation sought to determine if participation in *A Matter of Balance* increased levels of fall management, increased physical activity, and decreased social limitations with regards to fear of falling. Additionally, it identified if these gains in reducing incidence of and fear of falling were maintained after program conclusion.

The evaluation methods used in this study were a repeated-measures, one group design. Data were collected at baseline, post program, and after six months. Only participants who completed at least five sessions and all surveys were included in the study. Participant demographics, including gender, age, and race, were summarized using descriptive statistics.

Data from responses to the research questions were analyzed using mean score changes and Chi-Square analysis. The research questions addressed in this study

included: Does participation in *A Matter of Balance* increase levels of fall management? Does participation in *A Matter of Balance* increase physical activity? Does participation in *A Matter of Balance* decrease social limitations with regards to fear of falling? Can these gains in reducing risk of falling be maintained after program conclusion? Impacts for the research measures of baselines, post-test surveys, and follow-up surveys were analyzed using mean score changes and Chi-Square analysis. Mean score changes and Chi-square test were used to assess the difference between baseline and posttest surveys and between posttest and follow-up surveys across outcome measures.

This chapter reports on the outcomes of the research questions of this thesis through data analysis. Results discussed include the outcomes of the program analysis, including program characteristics, participant characteristics, attendance, and participant outcomes.

Results

Program Characteristics

Program characteristics help the reader gain an understanding of the program setting. For this thesis, a total of 27 older adults participated in three *A Matter of Balance* programs offered at three affordable housing senior communities. The programs were delivered by four trained instructors. Of the 27 participants who enrolled in the program, 24 (88.9%) completed the necessary 5 sessions and all applicable surveys to be included in this study. Of the 24 participants who completed at least 5 sessions and all survey material, 24 (100%) participated in the 6-month follow-up surveys. The subsequence section includes detailed characteristics of these participants.

Participant Characteristics

Baseline personal characteristics provide demographics and an understanding of the participants in the program. These are analyzed in Table 1. More women (91.7%) than men (8.3%) participated in the program. The ages ranged from 64 to 93. Three (12.5%) were in the 60-69 range, 11 (45.8%) were in 70-79, 5 (20.8% were 80-89, and 5 (20.8%) were 90 and over. Of the completers, 2 were male. Seventy-five percent of participants were non-Hispanic, Caucasian individuals. All of the participants had an annual income less than 30 to 50 % of Area Median Income and all lived alone.

Table 1

Demographics of Program Participants

	Number	Percentage
Number of Participants	27	
Number of Completers	24	
Sex		
Female	24	88.9%
Male	3	11.1%
Age Range		
< 70	3	11.1%
70 - 79	12	44.4%
80 - 89	7	25.9%
> 90	5	18.5%
Race/Ethnicity		
American Indian or Alaskan Native	4	14.8%
Asian or Asian-American	3	11.1%
White or Caucasian	20	74.1%
Hispanic		
Yes	7	25.9%
No	20	74.1%
Household Size		
Living alone	27	100%
Living with one or more people	0	0.00%

Participant demographics in this study align with the demographics of participants in other studies evaluating *A Matter of Balance* program effectiveness. As with other studies, participants were mostly female (Batra et al., 2012, Healy et al., 2008, & Tennstedt et al, 1998). The majority of the participants fell in the 70 to 79 age range; however, a significant number (18.5%) were over 80 years of age. This age group is important to identify and reach with fall prevention interventions because the likelihood and severity of falls increases with age (Alexander et al., 1992). Finally, all of the participants had an annual income that was 30% to 50% of the Area Median Income. This subgroup of older adults is a priority to receive fall prevention interventions. Often this population starts with worse health statuses than those who are not low-income (Gibler, 2003). Studies have suggested that these elders also have the potential to make higher gains in reducing fall risk as compared to older adults who are not low-income (Smith et al., 2012). Researchers also demonstrated the need to examine program effectiveness within unique subgroups of older adults (Stevens & Olson, 2000). For this thesis, the program was offered at affordable housing with low-income older adults. This is a unique subgroup that could benefit from additional analysis of program effectiveness. Participant outcomes are included in the following section.

Participant Outcomes

The outcome evaluation examined changes resulting from the intervention were evaluated from baseline to post-test and follow-up survey to baseline using an analysis on the mean score change and Pearson Chi Square test. The results of both were consistent in noting an overall increase in falls management, decreasing social limitations with

regards to fear of falling, and increasing physical activity. Outcomes for the mean score changes can be seen in Table 2 and Pearson Chi Square Test can be seen in Table 3. In analyzing with the Chi Square test, results less than .05 were deemed significant.

Table 2

Participant Outcomes Analyzed Using Mean Score Changes

	Base-line Mean	Post Mean	Post Post Mean	Post vs. Base-line	Post Post vs. Base-line	Post Post vs. Post
Falls Management						
I can find a way to get up if I fall	3.07	3.25	3.17	0.18	0.09	-0.08
I can find a way to reduce falls	2.93	3.42	3.38	0.49	0.45	-0.04
I can protect myself if I fall	2.48	2.96	3.00	0.48	0.52	0.04
I can increase my physical strength	3.04	3.63	3.29	0.59	0.25	-0.33
I can become more steady on my feet	2.81	3.33	3.13	0.52	0.31	-0.21
Social Limitation						
During last 4 weeks	2.70	2.17	2.08	-0.54	-0.62	-0.08
Physical Activity						
Walking or exercising	4.22	5.00	4.92	0.78	0.69	-0.08

An analysis of data using mean score change and Chi Square test between the pre-test and post-test was used to answer the three research questions of: Does participation in *A Matter of Balance* increase levels of fall management? Does participation in *A Matter of Balance* increase physical activity? Does participation in *A Matter of Balance* decrease social limitations with regards to fear of falling? Data analysis between the pre-

test and follow-up survey using mean score change and Chi Square test was used to analyze the fourth research question: Can these gains in reducing risk of falling be maintained after program conclusion? These outcomes can be viewed in Table 2 and Table 3 and are discussed in the remainder of this section.

Table 3

Participant Outcomes Analyzed Using Chi Square Test

	Post vs. Pre	Post Post vs. Pre
Falls Management		
I can find a way to get up if I fall	0.499	0.897
I can find a way to reduce falls	**0.003**	**0.042**
I can protect myself if I fall	0.052	**0.021**
I can increase my physical strength	**0.002**	0.330
I can become more steady on my feet	0.073	0.347
Social Limitation		
During last 4 weeks	**0.037**	**0.046**
Physical Activity		
Walking or exercising	**0.002**	**0.009**

Note. Statistically significant outcomes (.05) are in boldface.

The initial research question of the program increasing falls management was answered by the responses to the statements: *I can find a way to get up if I fall, I can find a way to reduce falls, I can protect myself if I fall. I can increase my physical strength. I can become more steady on my feet.* In analyzing the pre and post-tests through the mean, it was determined that for the Falls Management Scale, there were increases in most categories. This is demonstrated in Table 2. All categories increased from baseline to post-survey. One category, *I can protect myself if I fall* (.04), increased from baseline to post-survey and from post-survey to follow-up survey. The remaining questions within

falls management increased at the post-survey and then decreased slightly at the follow-up survey. None returned to the mean at baseline in the follow-up survey. *I can find a way to reduce falls* (-.04) and *I can find a way to get up if I fall* decreased (-.08) very slightly from post-survey to follow-up survey.

Using the Chi Test to analyze the falls management scale in Table 3 revealed that of the five measures within the falls management scale certain measures were not all significant. Two measures were considered significant from the baseline survey to the post-test. These were *I can find a way to reduce falls* (.003) and *I can increase my physical strength* (.002). The statement, *I can protect myself if I fall* (.052) came very close to being determined significant. In analyzing the follow-up survey with the pre-survey, *I can find a way to reduce falls* (.042) and *I can protect myself if I fall* (.04) showed significance.

The research question of increasing physical activity was measured by the question, *How much are you walking or exercising now?* Using changes to the mean in Table 2, participants increased their physical activity from baseline (4.22) to post-survey (5.00) and baseline (4.22) to follow-up survey (4.92). This increase decreased only by a small amount (-.08) from post-survey (5.00) to follow-up (4.92). This increase in the mean for the physical activity measure indicated that after attending the AMOB program, participants increased and sustained their increase in physical activity at program conclusion and 6 months post program.

Using the Chi test in Table 3 to analyze the physical activity research question showed that there was a significant change (.002) from the post-survey to the pre-survey and a significant increase (.009) from the follow-up survey to the pre-survey.

The research question of if participants have decreased social limitations with regard to fear of falling was answered by the survey question, *During the last four weeks, to what extent has your concern about falling interfered with your normal social activities with family, friends, neighbors, or groups?* Using the change in the mean in Table 2, the post-survey (2.17) demonstrated a large decrease from the baseline (2.70) and the follow-up survey (2.08) from the baseline (2.70). The mean decreased over the six-month period further from 2.17 (post-survey) to 2.08 (follow-up survey). This analysis showed continued improvement in decreasing fear of falling resulting in activity limitation immediately at program conclusion and a further decrease at the 6-month measure.

Using the Chi test in Table 3 to analyze the decreased social limitations due to fear of falling revealed that there was significance between the post-survey and pre-survey (.037) and the follow-up survey and pre-survey (.046). In this thesis, both the mean scores changes and the Chi-Square test were utilized to analyze data.

Conclusion

The study results demonstrate the effectiveness of *A Matter of Balance* at three affordable housing sites. Results show immediate improvements in the three measures of falls management, levels of exercise, and social limitations at program conclusion. Although most of the measures decrease slightly after the 6-month follow-up, the

changes remained at a higher level than baseline. These immediate and sustained changes reflect the inclusion and emphasis of the Stages of Change theory. The stages include Precontemplation, Contemplation, Preparation, Action, and Maintenance. The progression of the program guided the participants through each of the stages. The increases in falls management and physical activity and decrease in social limitations reflect individual participants cognitively making behavior changes during the program and then sustaining, or maintaining, these changes 6 months after program completion (Prochaska & DiClemente, 2005 & Sleet et al., 2008). Chapter five includes the summary, conclusions, and recommendations for further study.

CHAPTER 5

SUMMARY, CONCLUSIONS, & RECOMMENDATIONS FOR FURTHER STUDY

This study sought to determine if *A Matter of Balance* could result in significant and sustained improvements in participants' level of falls management, level of exercise, and social limitations with regard to concern about falling. Findings from data analysis show that participants showed immediate improvement of the three measures, and while most of these measures slightly decreased at the six-month follow-up, they sustained an improved level of improvement.

In response to the research question of falls management, the investigator determined that, although there were consistent increases within the falls management scale from baseline to post-survey and baseline to follow-up survey using the mean change test, only two of the five were deemed statistically significant at both the program conclusion and six-month measure. This indicated that although the entire measurement was not significant, there was a trend towards increased falls management. In addition, the slight decreases within the measures did not revert to the initial baseline measure, indicating increased falls management. This increase was sustained greater than prior to program commencement.

Data analysis showed that the questions of increasing physical activity and decreasing social limitations clearly demonstrated statistical significance in both immediate and sustained impacts for participants. Results were consistent with prior *A Matter of Balance* research studies, showing increased levels of falls management as

shown in studies by Tennstedt et al. (1998) and Healy et al. (2008) which included increased physical activity, decreased social limitations, and increased falls management.

In the review of falls and falls prevention program, there was a need for evaluating fall prevention programs in diverse groups and settings (Stevens & Olson, 2000). This study sought to evaluate the effect of the *A Matter of Balance* program on a specific group of individuals, low-income older adults living in affordable housing communities. This was an important group for falls prevention programs because older adults with low-income often have poor health conditions and an increased likelihood of falls (Gibler, 2003 & Smith et al., 2012). In addition, affordable housing communities provide an accessible and effective platform for service delivery (Enterprise Community Partners & LeadingAge, 2011 & USDHHS et al., 2014). In response to this need for evaluation and opportunity for service delivery, the *A Matter of Balance* program was implemented at affordable housing sites in Northern California to reduce the risk, negative effect, and incidence of falls. This evaluation confirmed that the program was effective in increasing falls management and physical activity and decreasing social activity limitation due to fear of falling. The positive, significant, and sustained results for two of the measures, physical activity and social limitations, and within the third measure of falls management for this group indicate program effectiveness for low-income older adults in affordable housing settings.

The Stages of Change Theory is useful when working with individuals to change risky behaviors and mitigate fall risk as well as when structuring and implementing a fall prevention program (Sleet et al., 2010). It is important to consider behavioral approach

with fall prevention, because behavior change is crucial to decrease in injuries and risk of injury (Sleet et al., 2008). Recognizing that older adults may be hesitant to incorporate fall prevention strategies and that a substantial portion are afraid of falling are important factors to incorporate when designing community fall prevention programs (Boyd & Stevens, 2009). For an older adult to adopt a mitigating behavior, such as decreasing fall risk, movement from one stage to the next is necessary. By identifying what stage an individual is in, a leader may select and focus on an appropriately matched intervention (Sleet et al., 2010). In *A Matter of Balance*, facilitator guided participants through the various stages of change. The program started with education of fall risk and personal risk assessments to create a situation for the participant to move from Precontemplation to Contemplation. Action planning and risk reduction strategies assisted the older adult in the Preparation stage. The weekly inclusion of exercise and six-week program length is a component of Action because it reduces fall risk. Also, during the program, participants plan for continued behavior change by discussing barriers and solutions to continued fall risk reduction (Prochaska & DiClemente, 2005). The results of the study reflected the individual participants' achievement of behavior changes. The post survey results immediately at the conclusion of the program reflect changes in beliefs, behavior, and action in the present, which achieved the Action stage. Results comparing the follow-up data to the baseline and post-survey showed that these behavior changes were sustained through six months, which suggested the Maintenance stage of the Stages of Change Theory. The incorporation of Stages of Change in *A Matter of Balance* led to the successful achievement of risk reduction through behavior change.

This study had several limitations. First, the small study size of 27 total and 24 completers made it hard to generalize for a larger population. In addition, the study was performed at three affordable housing sites from the nonprofit organization, Mercy Housing. This had limited generalizability to all affordable housing sites without a larger sample size and differentiation of housing organization. Thirdly, program participants voluntarily joined the program because they thought there would be a personal benefit to attending. The participants were not randomly selected. Next, this study was not designed with a control group. Therefore, results could be influenced by other treatments, interventions, or events. Lastly, all data was self-reported, so it was subject to personal bias and desire to report improved outcomes.

Various recommendations for future study can be made. It is recommended that the impacts of the program are assessed over a longer period of time to evaluate retention of behavioral change and fall risk reduction. Another recommendation is for further study to specifically investigate the impact of the program across a larger population of older adults in affordable housing. These results of program effectiveness should be compared to another setting to provide research showing if low-income older adults experience increased gains as compared to older adults who are not low-income.

In conclusion, falls present serious health, psychological, financial, and environmental burdens for older adults and society. Proven effective in reducing fall risk and increasing activity among elders, *A Matter of Balance* was implemented at various Mercy Housing affordable senior sites in California. Affordable housing provides an accessible and effective platform for service delivery, and there was need to evaluate fall

prevention programs for older adults living in the community, specifically those who are low-income. The results of this study include that program implementation at affordable housing communities for low-income older adults was effective in increasing falls management and physical activity and decreasing social limitations caused by fear of falling. Through the six-month follow-up evaluation, the researcher determined that, although there were slight decreases in these improvements, the results continued to be sustained after program completion. This thesis supported previous research proving the effectiveness of *A Matter of Balance*, and furthered this by addressing the need for further evaluation of specific groups of older adults through proving the effectiveness of the program for low-income older adults in affordable housing.

APPENDIX A

SACRAMENTO STATE
Redefine the Possible

Institutional Review Board (IRB)
FWA00003873

January 4, 2016

IRB PROTOCOL #15-16-054

Ms. Erica Plumb
Gerontology
Social Sciences and Interdisciplinary Studies

RE: IRB Approval

Dear Ms. Plumb:

On December 22, 2015, Sacramento State's Institutional Review Board (IRB) reviewed the proposal entitled "Evaluation of a Fall Prevention Program for Older Adults in Affordable Housing Communities." Your project received an **Exempt** (45 CFR 46.101(b)(1)) review and was approved on January 04, 2016.

This approval is effective through **December 22, 2016**. This research is to be conducted according to the proposal that was approved by the IRB. Procedural changes or amendments must be reported to the IRB, and no changes may be made without IRB approval except to eliminate apparent immediate hazards. For additional information, see *Modification Request* on the website.

If you wish to collect additional data beyond the expiration date, you will need to request an extension. For additional information, see *Annual/Semi-Annual Protocol Report* on the website.

This IRB approval is with the understanding that you will *promptly* inform the IRB if any unanticipated adverse reaction should occur while conducting your research (see *Adverse Event/Unanticipated Problem* the website). Adverse reactions include but are not limited to bodily harm, psychological trauma, and the release of potentially damaging personal information.

Should you need further information about the protection of human subjects, please consult our Human Subjects Website or contact the Research Integrity and Compliance Analyst, Leah Vargas, at 916-278-5674 or leah.vargas@csus.edu.

Thank you and best wishes for continued success.

CC: IRB file
Dr. Cheryl Osborne

APPENDIX B

INFORMED CONSENT

Evaluation of a Fall Prevention Program for Older Adults in Affordable Housing Communities

You are invited to participate in an IRB approved research study which will involve completing follow-up surveys to the fall prevention program you participated in earlier this year. My name is Erica Plumb, and I am a Special Masters Student at California State University, Sacramento, Gerontology.

Your participation in this project is voluntary. Even after you agree to participate, you may decide to leave the study at any time.

The purpose of this research is to evaluate if the fall prevention program participants at three affordable housing communities have demonstrated significant and sustained improvements in their level of falls management, level of exercise, and social limitations with regards to concern about falling. If you decide to participate, you will be asked to complete follow-up surveys which are the same surveys you completed at the end of the fall prevention program.Your participation in this study will last 35 minutes. Risks associated with this study are not anticipated to be greater than those risks encountered in daily life. If you have any questions about your rights as a participant in a research project please call the Office of Research Affairs, California State University, Sacramento, (916) 278-5674, or email irb@csus.edu.

Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission. Measures to insure your confidentiality are that only the investigator will have access to the raw data, data will be stored in a secure location and on a password protected computer, and raw data will be maintained for three years. Identifiers will by removed upon entry into excel. Names will be assigned numbers and birthdays will be changed to age. De-identified data will be stored for three years on a password-protected computer. The data obtained will be maintained in a safe, locked location and will be destroyed after a period of three years after the study is completed.
There is no applicable physical or economic risk of participation. Minimal psychological risk has been identified, including possibility of anxiety, stress, or sadness of physical condition related to falls. Participants may withdraw from the study at any time. On site service staff is available for emotional support. Minimal sociological risk includes the possibility of disclosed data that would jeopordise the individual's social standing or reputation. Risk will be minimized by protecting data collected from the survey. Benefits to participating in this study inclue an opportunity for the participant to self evaluate their progress by completeing the follow-up survey. The benefit to society is that this research will contribute to the current research of falls prevention and effectiveness of fall prevention programs.

Your signature below indicates that you have read and understand the information provided above.

Signature _____ Date _____

APPENDIX C

A MATTER OF BALANCE
MANAGING CONCERNS ABOUT FALLS

Attendance

Start Date: __ __ / __ __ / __ __ __ __

End Date: __ __ / __ __ / __ __ __ __

	Session								
Participant Name:	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Total**
	○	○	○	○	○	○	○	○	
	○	○	○	○	○	○	○	○	
	○	○	○	○	○	○	○	○	
	○	○	○	○	○	○	○	○	
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	○	○	○	○	○	○	○	○	

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APPENDIX D

A MATTER OF BALANCE
MANAGING CONCERNS ABOUT FALLS

First Session Survey

Today's Date: Month ☐☐ / Day ☐☐ / Year ☐☐☐☐

Your Name: First ☐☐☐☐☐☐☐☐☐☐ Last ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

The following questions will provide us with background information.

1. What is your date of birth? Month ☐☐ / Day ☐☐ / Year ☐☐☐☐

2. What is your zip code? ☐☐☐☐☐

3. Today, how many people live in your household (including yourself)? ☐

4. Are you: ○ Female ○ Male ?

5. Are you of Hispanic, Latino, or Spanish origin?
   - ○ Yes
   - ○ No
   - ○ Unknown

6. What is your race? (Mark all that apply.)
   - ○ American Indian or Alaska Native
   - ○ Asian or Asian-American
   - ○ Black or African-American
   - ○ Hawaiian Native or Pacific Islander
   - ○ White or Caucasian
   - ○ Other _____

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

First Session Survey (continued)

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
1. I can find a way to get up if I fall	○	○	○	○
2. I can find a way to reduce falls	○	○	○	○
3. I can protect myself if I fall	○	○	○	○
4. I can increase my physical strength	○	○	○	○
5. I can become more steady on my feet	○	○	○	○

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

Mark ONLY ONE CIRCLE to tell us how much you are walking or exercising now.

○ I do not exercise or walk regularly now, and I do not intend to start.
○ I do not exercise or walk regularly, but I have been thinking of starting.
○ I am trying to start to exercise or walk.
○ I have exercised or walked infrequently for over a month.
○ I am doing moderate exercise less than 3 times per week.
○ I have been doing moderate exercise 3 or more times per week.

APPENDIX E

A MATTER OF BALANCE

MANAGING CONCERNS ABOUT FALLS

Last Session Survey

Today's Date: Month ☐☐ / Day ☐☐ / Year ☐☐☐☐

Your Name: First ☐☐☐☐☐☐☐☐☐☐ Last ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

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
1. I can find a way to get up if I fall	○	○	○	○
2. I can find a way to reduce falls	○	○	○	○
3. I can protect myself if I fall	○	○	○	○
4. I can increase my physical strength	○	○	○	○
5. I can become more steady on my feet	○	○	○	○

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

Mark ONLY ONE CIRCLE to tell us how much you are walking or exercising now.

○ I do not exercise or walk regularly now, and I do not intend to start.
○ I do not exercise or walk regularly, but I have been thinking of starting.
○ I am trying to start to exercise or walk.
○ I have exercised or walked infrequently for over a month.
○ I am doing moderate exercise less than 3 times per week.
○ I have been doing moderate exercise 3 or more times per week.

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APPENDIX F

A MATTER OF BALANCE
MANAGING CONCERNS ABOUT FALLS

Class Evaluation

Today's Date: Month ☐☐ / Day ☐☐ / Year ☐☐☐☐

Thank you for participating in *A Matter of Balance*. To help us further meet the needs of others throughout the community, please take a few minutes to complete this evaluation form. We appreciate your feedback.

Please tell us your thoughts about the *A Matter of Balance* class. Mark the answers that apply on the front and back of this page.

1. The leaders were well prepared.
   ○ Strongly agree ○ Agree ○ Disagree ○ Strongly disagree

2. The classes were well organized.
   ○ Strongly agree ○ Agree ○ Disagree ○ Strongly disagree

3. The participant workbook helped me better understand the classes.
   ○ Strongly agree ○ Agree ○ Disagree ○ Strongly disagree

4. As a result of this class, I feel more comfortable talking with others about my fear of falling.
   ○ Strongly agree ○ Agree ○ Disagree ○ Strongly disagree

5. As a result of this class, I have made changes to my environment.
   ○ Strongly agree ○ Agree ○ Disagree ○ Strongly disagree

6. As a result of this class, I feel more comfortable increasing my activity.
   ○ Strongly agree ○ Agree ○ Disagree ○ Strongly disagree

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

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A Matter of Balance Class Evaluation (continued)

7. As a result of this class, I plan to continue exercising.
   ○ Strongly agree ○ Agree ○ Disagree ○ Strongly disagree

8. I would recommend this class to a friend or relative.
   ○ Strongly agree ○ Agree ○ Disagree ○ Strongly disagree

9. Are you: ○ Male ○ Female ?

10. How old are you?

○ Less than 60 years	○ 75-79 years
○ 60-64 years	○ 80-84 years
○ 65-69 years	○ 85-89 years
○ 70-74 years	○ 90 years or older

What other changes have you made as a result of this class?

Other comments or suggestions?

APPENDIX G

Matter of Balance Permission

From: Patricia E. League [mailto:LEAGUP@mainehealth.org]
Sent: Thursday, December 17, 2015 12:48 PM
To: Erica Plumb
Cc: Judith Tierney
Subject: RE: Matter of Balance Project

Hi Erica

It was nice to talk with you earlier today and hear about your desire to follow MOB graduates out 6 months to see if they have maintained the changes they made during the 8 sessions of the class.
Feel free to utilize the attendance sheet, survey, and class evaluation that were used as part of the class. We are always delighted to hear of students in the field of aging that are interested in learning from the older adults that have taken the class. I have attached a retrospective study performed by CMS on A Matter of Balance as part of the ACA. The results were very favorable with health care savings. A Prospective study just completed enrollment earlier this month and will follow MOB graduates for I believe 6 months out as well.
I have attached several pieces of information that I hope you will find useful.
Best of luck and feel free to contact me if you have any additional questions.
Happy Holidays
patti

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