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**FACTORS IMPACTING ADHERENCE TO A MULTIFACTORIAL FALL
PREVENTION PROGRAM - A MATTER OF BALANCE**

By

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ABSTRACT

BACKGROUND AND PURPOSE: Falls among community dwelling older adults are a significant public health problem. “A Matter of Balance” (MOB) is a multifactorial fall prevention program that aims to improve participants’ self-efficacy and increase physical activity in order to reduce falls. Although there is some evidence supporting MOB’s effectiveness, no published studies to date have examined the program from the perspective of participants or long-term program adherence. As such, the purpose of this study was to examine self-reported outcomes associated with the MOB program in order to explore participants’ perspectives and program adherence.

METHODS: This study utilized a mixed methods design that incorporated both survey and focus group interview data. Subjects included a convenience sample of 28 healthy community dwelling older adults who were enrolled in 4 separate MOB programs in the Twin Cities. Survey data were collected before the program and immediately after, 6-weeks, and 6-months post-program. Survey items addressed demographics, general health, falls management, exercise behavior, and number of falls. Focus groups were scheduled 3 to 5 months post-program and led by a principle investigator and student researchers. Semi-structured interview questions focused on participants’ experience of the MOB program, recommendations that were or were not implemented, and motivation for and barriers to change.

RESULTS: 70.4% of the participants completed all 4 surveys. Statistically significant improvements were identified for 2 survey items including: “I can find a way to reduce falls” and “I can protect myself if I fall”. No significant change over time in exercise level or number of falls was identified. Ten subjects participated in 4 focus groups. Qualitatively, 7 themes emerged from the focus group data. These were: awareness, motivators for attendance, class learning environment, current adherence, facilitators and barriers to adherence, and recommendations for future programming.

CONCLUSION: Overall, MOB’s effectiveness was evidenced by increased awareness, which may be related to improved falls management, self-efficacy and motivation. Post-program adherence to physical activity recommendations was facilitated when activities were incorporated into participants’ existing routines. Participants desired a follow-up program for continued social support and accountability but further research is needed to investigate the efficacy of this type of intervention.

The undersigned certify that they have read, and recommended approval of the research project entitled...

FACTORS IMPACTING ADHERENCE TO A MULTIFACTORIAL FALL PREVENTION PROGRAM - A MATTER OF BALANCE

submitted by
Megan Dean
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In partial fulfillment of the requirements for the Doctor of Physical Therapy Program


Primary Advisor  Date 3/30/16

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CHAPTER I: INTRODUCTION AND LITERATURE REVIEW

Background

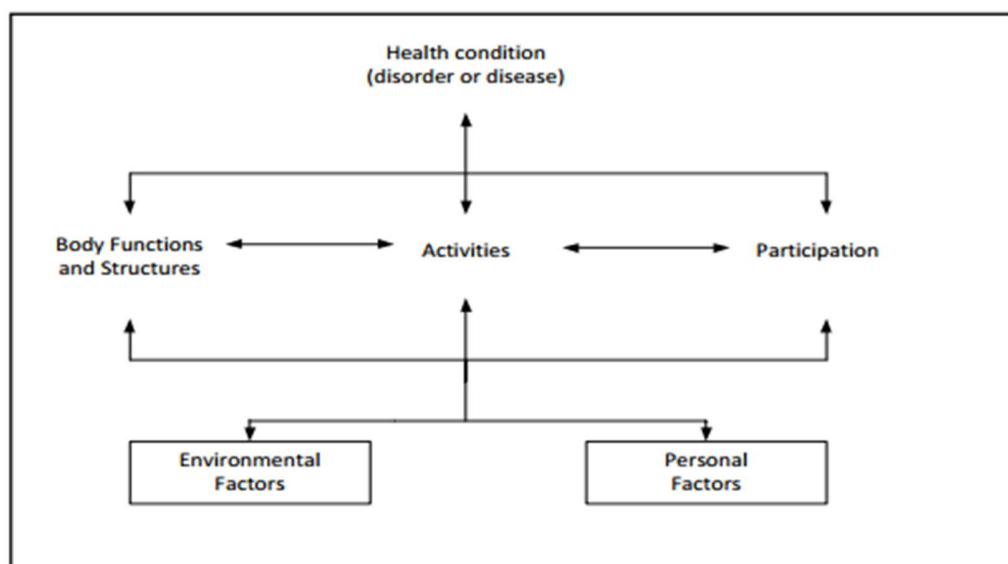
Falls are a widespread problem among the aging population. Approximately one-third of older adults will experience a fall each year. As the leading cause of fatal and nonfatal injuries in elderly adults, falls were responsible for approximately 2.5 million visits to the emergency department in 2013.¹ Approximately 30% of falls result in moderate to severe injuries including, but not limited to, hip fractures and head trauma.¹ In addition to physical injury, psychological impact after an initial fall can also lead to further declines in function. After a fall, 23-43% of older adults develop a fear of falling and consequently will self-restrict their activities in order to prevent future falls and injuries.² There are many factors associated with aging that play a role in falls and may contribute to a downward spiral of worsening health and quality of life, termed the “cycle of frailty.”³ According to this model, aging adults who have fallen previously are more likely to fall again due to increased fear of falling or implications of previous falls.

Falls are not only detrimental to the health of older adults, but also have a staggering impact on health care costs. In 2012, health care costs associated with fatal and nonfatal falls exceeded \$30 billion dollars.¹ Costs included emergency room expenses, hospital stays, prescriptions, adaptive equipment, transitional care unit stays, and home care services. Due to a growing baby-boomer population, as well as large health, functional, and financial costs

connected to falls, decreasing falls and improving balance have been the primary goals for many public health and community outreach programs.

One approach to analyzing the complexity of balance is to use a framework that classifies factors that may contribute to an individual's balance and fall risk, such as the International Classification of Functioning, Disability and Health (ICF) model.⁴ The World Health Organization developed the ICF model in order to classify health and health related domains. The model organizes an individual's structural and functional impairments within the context of the unique environmental and personal factors that may impact their ability to participate in their life roles.⁴ The ICF model can be used to evaluate an individual's health conditions, body structure or functional impairments, and contextual factors, both personal and environmental, that may contribute to their balance and fall risk (Figure 1). These ICF categories and their relationship to falls risk will be discussed in the following paragraphs.⁴

Figure 1. The ICF Model⁴



Various health conditions and comorbidities may impact an individual's risk for falling.⁵ For example, cardiovascular comorbidities including orthostatic hypotension, cardiac arrhythmias, and cardiovascular disease are more prevalent with age and can negatively affect tolerance to activity. Safety and mobility are influenced by impaired cognition, pain, and altered perceptions as a result of various neurological pathologies, including central and peripheral nervous system comorbidities. Additionally irregular blood glucose levels or reduced sensation via peripheral neuropathy can result from endocrine related pathologies, such as diabetes. Both of these impairments have implications for increased falls risk.⁶

In addition to these health conditions, researchers have investigated many body structure and functional age-related changes that are linked to balance and

falls in the community dwelling older adult population. Due to these changes, older adults have an increased risk for falls compared to the general population.⁷ With age, vision system changes, such as decreased visual clarity and precision, are coupled with decreased pupillary reactions. These age related visual changes make it difficult for older adults to anticipate changes or distractions within the environment, which may provoke a loss of balance. Changes in neural-processing of the sensory system also impact older adults. A decrease in the sensitivity of sensory receptors and proprioceptive organs make the body less effective at sensing stimuli to indicate an external force or a change in body position that may lead to a loss of balance. Reaction time increases with age, therefore prolonging the window of time an elderly adult takes to respond to a loss of balance, which makes recovery of a loss of balance more difficult. Musculoskeletal system changes such as sarcopenia, which is the gradual loss of muscle mass with age, can greatly impact functional mobility in the elderly population.⁶ Sarcopenia in the lower extremities can especially contribute to falls as it may result in gait impairments and difficulty adjusting to unstable surfaces.⁸ As a result, decreased lower extremity strength can contribute to the fall itself as well as create a challenge for an older adult to get back up once they fall. Furthermore, osteoporosis impacts skeletal integrity reducing structural support of the bones. Reduced bone density can lead to fractures which often times can cause a fall itself, but also increases the risk of a fracture upon impact of a fall.⁶

Personal factors such as medication usage, history of falls, and fear of falling also contribute to a patient's risk for falls. Adults over 65 years old typically consume more medications and thus have a higher prevalence of adverse drug interactions compared to their younger counterparts. This is oftentimes referred to as polypharmacy.⁶ An adverse drug reaction is an undesired and potentially harmful side effect of a medication.⁶ Adverse drug reactions such as confusion, orthostatic hypotension, fatigue, weakness, and dizziness can contribute to an individual's risk for falling.⁶ Beyond medication, another personal factor of concern with regard to falls is that an individual may develop a fear of falling if they have a history of falls or if they have suffered an injury from a previous fall. If an individual develops a fear of falling they may self restrict from activities that once challenged their balance.² An example of this might be an adult who no longer goes on walks in the park because of uneven terrain.

Environmental factors can also play a significant role in falls risk. Environmental factors can include slippery surfaces, cluttered floors, pets, improper footwear and others. The physiological changes associated with aging, as well as an increased prevalence of comorbidities, can make environmental factors that were once manageable become hazardous.

These age-related health conditions, body structure and functional impairments, and personal and environmental factors that contribute to imbalance can build on each other which may increase an individual's risk of falling. The influence these factors have on one another in regard to an

addressing a body structure or functional impairment or a contextual factor in order to reduce an individual's fall risk. On the other hand, a multifactorial intervention design addresses a combination of body structure or functional impairments and contextual factors.

Single Intervention Studies

An example of a single intervention program that focuses on a body structure or functional impairment is a fall prevention program that focuses on strengthening to address muscle weakness. The strengthening exercise program would attempt to delay sarcopenia in order to reduce an individual's fall risk. An example of a single intervention program that focuses on modifying a contextual factor is a medication review by a physician, which would attempt to reduce risks associated with polypharmacy.

Single intervention programs are typically developed to target one specific area of intervention such as exercise. A review article evaluating the effectiveness of 10 single intervention randomized controlled trials (RCT) studies found that prescribed exercise to improve balance, strength, or endurance/aerobic capacity, was effective in reducing risk of falling compared to a no-exercise control group. The analysis concluded that best results were found in programs that included 2 of the 3 exercise focus areas (strength, balance, endurance) and an effective program should last 12-weeks.¹⁰

Another area of single intervention, home modifications, was not strongly supported as an effective method to reduce falls.¹¹ An analysis of 4 RCT home hazard evaluation studies emphasized that a PT or OT should perform the assessment and best results may come when this intervention is used with an older adult population with a prior fall history.¹⁰ A limitation of this type of program is that they are unable to address falls that occur in the community or anywhere else outside of the home environment.

Though single intervention programs target one intervention, some single intervention programs have effects on multiple different body function and structural factors. An example of this occurrence was found in a 2013 study by Jorgenson et al¹² where the Wii gaming system as a single intervention was used to improve balance with specialized biofeedback games within the community dwelling older adult population. This 10-week program resulted in significant improvement in lower extremity strength, improved falls self-efficacy, improved functional mobility scores as evident by decreased Timed Up and Go times and chair rise test timed scores. There were also high rates of adherence due to the entertainment aspect of the training. However this study did not record the number of falls the subjects experienced before or after the program and there was a lack of follow-up after the program ended.

Single intervention programs have the advantage of focused education and prevention in one area, in contrast to multifactorial intervention programs which focus on several selected intervention areas. However, overall comparison

between single and multifactorial programs has been difficult due to the widespread heterogeneity between programs. Despite this, there is a growing trend for a multifactorial approach to encompass the many risk factors that older adults possess.¹³

Multifactorial Intervention Studies

Multifactorial programs are directed towards addressing the multifaceted nature of balance including interventions targeted towards various body structure and functional impairments as well as contextual factors. As a whole, multifactorial fall prevention programs are supported to reduce rate of falls but the components of multifactorial programs are widely variable.⁹ Guidelines from the American Geriatric Society recommend a multifactorial program approach in which a program is individualized to the patient's risk factors determined by a falls screening process.⁷ Furthermore, these guidelines promote multifactorial programs that emphasize "environmental adaptation; balance, transfer, strength, and gait training; education in medications, particularly psychoactive medications; and management of visual deficits, postural hypotension, and other cardiovascular and medical problems."⁷ Yet the ideal number and combination of interventions chosen to incorporate into a program has not been determined by research.¹⁴

One study analyzed a multifactorial intervention program with an exercise component as a way to decrease falls. In this study, participants completed a risk

factor screen before being randomly allocated to the intervention or control group. The intervention group, received health education, home safety evaluation, medication review, and referrals for other services in addition to participating in an 8-week long progressive intensity exercise program. The control group only received health education. The intervention group demonstrated improvements in the Physiological Profile Assessment (PPA) fall risk index, reaction time, postural sway with eyes open, Timed Up and Go test, Geriatric Depression Scale, and fall incidence at 3-months. However, at 12-months post-assessment no significant difference in fall incidence was found.¹⁵

Another study focused on an individualized multifactorial risk factor analysis and recommendation program for community-dwelling older adults (n=349).¹⁶ The intervention group received a multifactorial in-home assessment with recommendations for safety, exercises, and referrals. The control group received only in-home safety recommendations and the recommendation to discuss falls risk with their doctor. After the initial assessment, both groups received a monthly phone call for the next 11 months to answer questions, follow up on recommendations, and facilitate adherence. At 1 year follow-up the intervention group did not differ in comparison to a control group in number of reported falls, hospitalizations, or nursing home placements. This perhaps reveals that multifactorial programs may need to be more involved beyond monthly phone call to facilitate adherence.¹⁶

Though multifactorial programs are supported for fall prevention in the literature, many aspects are still being investigated for optimal effectiveness. A multifactorial intervention program can be effectively led by a multidisciplinary team including nurses, physicians, pharmacists, physical therapists, occupational therapists, and others. However, having many professionals involved can lead to a burden of time commitment required, as many of these professionals have full time caseloads.¹⁷ Recommendations for frequency and duration also vary and will be discussed below in relation to adherence. While the composition of a balance program may be purposefully designed to meet the needs of its participants, its resulting effectiveness relies on participant adherence.

Factors Impacting Adherence

Although multifactorial intervention programs have been shown to be a beneficial approach, effectiveness can be limited by low adherence. The Oxford Dictionary defines adherence as “the fact of behaving according to a particular rule...or of following a particular set of beliefs, or a fixed way of doing something.”¹⁸ In the context of balance programs, adherence is performing the protocol within the established parameters. For example, a participant would adhere to physical activity recommendations such as intensity, repetitions, sets, frequency, or duration in order to continue to decrease their fall risk. Current literature has sought to identify factors impacting adherence through qualitative studies with data from self-report surveys and focus groups. These factors can

be categorized as nonmodifiable and modifiable factors. Nonmodifiable factors include cognitive function, socioeconomic status, and education level. Modifiable factors include both individual factors, or those that vary among each participant, and programmatic factors, or those factors that can be highly influenced by the design of the program. Individual modifiable factors have the greatest impact on adherence and include self-efficacy, motivation, social support, and perceived benefits from a balance program. Program design is a programmatic modifiable factor that highly impacts program adherence.

Nonmodifiable Factors

Findorff et al¹⁹ found that intact cognitive function had a direct correlation with adherence to a balance home exercise program. This study addressed exercise adherence in older adult women, the majority of whom were white, middle class, and sedentary at baseline. Participants in this study were prescribed walking and balance exercises according to their current level of function and endurance. Eleven balance exercises involved weights and were incorporated with 30 minutes of walking 5 days a week for 12 weeks. Modifications to balance exercises were made according to each participant's needs. Adherence was measured using a self-reported exercise log. They found a significant predictor of adherence to be intact cognition, as measured by a mini-mental score greater than 27.¹⁹

In addition to impaired cognitive status, participants with lower socioeconomic status were also found to have lower adherence rates. A study by Brawley et al²⁰ used the Behavioral Risk Factor Surveillance System (BRFSS) report to assess the short-term adherence of adults 65 years and older to physical activity programs including strength, balance, mobility, and flexibility exercises. These older adults reported they were less likely to engage in leisure physical activities, such as walking outside, when they felt unsafe in their neighborhood. This may partly be due to environmental barriers including a lack of sidewalks and having no place to sit down. In another study, of those who reported these barriers, women over the age of 65 were more likely to report a perception of environmental barriers as compared to their younger counterparts.²¹

Lower level of education was another reported barrier to adherence. Multiple studies reported that patients who had lower levels of education described thinking physical activity must be vigorous in order to benefit their health. This misunderstanding, that participants believed low and moderate levels of physical activity would not benefit their health, may have prevented them from participating in less vigorous activities.²²⁻²⁵

Though fall prevention programs have a limited ability to influence these non-modifiable factors, they are important factors to be aware of as they may influence participants' adherence. By addressing modifiable factors, fall prevention programs can have a greater impact on adherence.

Modifiable Factors – Individual

Individual modifiable factors are more susceptible to change, but are highly variable as they are dependent on each individual participant's attitude, beliefs, and lifestyle. Within fall prevention programs, these factors include self-efficacy, motivation, social support and interaction, and perceived risks and benefits of participation. Self-efficacy is defined as, "people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives. Self-efficacy determines how people feel, think, motivate themselves, and behave" (Dictionary of sport and exercise science and medicine.²⁶ Findorff et al¹⁹ reports self-efficacy as significant in predicting balance program adherence. A study by Yardley et al²⁷ noted that self-efficacy was found to be particularly important in initiating behavior whereas self-regulation was important for sustaining a behavior. A key component for improving self-efficacy is education. A qualitative study by Yardley et al²⁸ interviewed 6 adults about their perceived likelihood of falling and the impact of a fall on their life. Participants reported finding the fall prevention education useful but did not see how it applied to their own lives as it seemed to be common sense and more applicable to other populations such as adults older than them and adults with disabilities. Participants also reported feeling patronized by the way the information was presented. Thus, these authors suggested focusing on the positive benefits associated with improved balance and strength. This approach may be more effective as it may simultaneously increase self-efficacy

and awareness of the benefits of balance exercise as a means of fall prevention.²⁸ However, further research in this area still needs to be done.

Self-efficacy is related to one's belief in their ability to change a behavior, whereas motivation is the desire to participate or change one's behavior. Participant motivation showed up a number of times in the literature as an important factor in program adherence. Robinson et al²⁹ studied 12 older adults with ages ranging from 72 to 88. These older adults participated in a regional falls and syncope service. After exercise-based interventions were completed, focus groups were conducted to identify why there was poor adherence to fall prevention programs among this population. They found that maintaining independence was the most important reason older adults participated in a falls prevention program. Researchers found that those who were encouraged to take ownership of their program and fit this program into their daily routine were more likely to continue on with the exercises. Additionally, they asked 18 physical therapists who worked with older adults for their perceptions about decreased adherence in this patient population. Physical therapists reported that the older adults they observed to have higher self-efficacy related to falls showed overall increased adherence for a longer duration of time. Conversely, they believed older adults with low levels of self-efficacy showed limited adherence to programs. This suggests that level of self-efficacy may have a positive correlation with adherence to fall prevention programs. Researchers also found that tracking changes in objective data motivated participants to keep up with the program

because it increased their confidence in their capabilities.²⁹ This is consistent with what Shakudo et al³⁰ found in tracking objective changes, such as body weight and performance measures. This objective data served as feedback, which was associated with increased adherence to an exercise program when compared to a control group that did not receive this feedback. In adults over age 65, Quindry et al³¹ found that improved health and fitness were the strongest motivators to participate in exercise programs. Elders were less motivated by reasons such as social interaction, stress relief, enjoyment, and body image. Finally, Yardley et al³² found that social support from family, friends, and program instructors helped motivate participants to attend by giving practical help and emotional support.

Beyond being a factor in motivation, social support itself is linked with adherence to fall prevention programs. In the study mentioned above, Yardley et al³² constructed semi-structured interviews in 6 different European countries using principles from the theory of planned behavior to gather information about people's feelings about falls, falls related interventions, factors contributing to or interfering with participation, and concerns people have about participation in the intervention. Through these interviews, a broad range of perceived benefits, factors encouraging participation, and factors interfering with participation were identified. In these interviews, participants reported advice and encouragement from health practitioners, more than family and peers, as having a strong impact on their willingness to participate. However, this advice and encouragement has

also been shown to increase an individual's fear of falling, by making them hyper-aware of their balance impairments. This hyper-awareness can lead to a further increase in fall risk.³² Despite this risk, researchers suggest that healthcare practitioners routinely recommend all older adults to participate in strength and balance programs to prevent falls. They also propose a variety of choices including individual and group options with different levels of education and activity to cater to individuals at all levels.³² Another reason health care professionals routinely promote these strength and balance training programs to all older adults is because the image older adults have of themselves does not always accurately reflect their risk for falls. This is supported in a study from Yardley et al²⁷, which used the theory of planned behavior as a framework to assess individuals' perceived risk and benefit from strength and balance training. Though this framework is useful for assessing changes in health behavior, it does not take into account social identity, social pressure, or social norms. This is key as older adults have reported low levels of social approval and support for exercise and vigorous activity in older adulthood.^{20,33-34} Similarly, many older adults acknowledge there is a risk for falling but deny their personal risk as they still consider themselves as active, mentally intact, and thus independent.

Lack of perceived personal benefits from fall prevention programs were identified as one of the main barriers to adherence. Older adults need to see the risk and consequences of falling as a risk in their own life in order to have motivation to stick with an intervention program. At the same time, it is important

for them to see a wide range of positive personal benefits from participation in a program in order for them to continue with the program.³² Elderly participants in Yardley et al's³² qualitative study mentioned improved physical abilities and activity enjoyment as reasons to stay involved with a balance program more often than reducing fall risk. A qualitative study by Dickenson et al³⁵ sought to find older adults' perceptions of facilitators and barriers to their participation in various fall prevention intervention programs ranging from tai chi to group exercise and posture classes. In this study, researchers used semi-structured interviews and found that participants did not see how the exercises they were doing were relevant. Some participants reported they were less likely to adhere to a program if they did not see improvements in their balance as quickly as they expected to. This reveals the importance of education about the interventions and how they will help prevent falls. This study did not specify whether these barriers were associated with adherence to participation for the duration of the intervention or during the follow-up. Another study by Gibson et al³⁶, used secondary data from medical documentation of 120 participants. The documentation included data from initial evaluation through follow-up interviews after treatment. These data were analyzed to find correlations between adherence to fall-prevention, fear of falling, health perception, and fall-prevention knowledge. These authors discussed barriers to adherence and hypothesized the application of these interventions to each individual's life was missing. This "transfer of knowledge", when a patient gains understanding and knowledge

about their exercises and incorporates them into their life, is an essential component to fall-prevention adherence.³⁶ Thus, education remains one of the most influential components of adherence to fall prevention balance programs. Education on the purpose of fall prevention is one portion of building an effective program, yet there are many other program related factors that may impact adherence.

Modifiable Factors – Programmatic

The programmatic modifiable factors involve the design of the balance program and are thus the simplest and most direct factors health care providers can influence. Many patients list various barriers to attendance of a balance program, but some main themes emerged in current literature. A self-reported survey conducted by Yardley et al³⁷ inquired about attendance in a strength and balance program in which 60% of participants reported they would participate if they were in their home while only 20% reported they would participate if it was in another facility. This shows people may be more likely to attend and adhere to recommendations in programs that can be done in the home. Similarly, a study by Lambert et al³⁸ used the Health Habit Survey (HHS) to give pre- and post-study surveys to community dwelling older adults after they completed 2 sessions of a fall prevention program. These sessions included education on fall risk and home safety as well as balance screening. Thirty participants completed the HHS with their opinions about potential modifications for improved adherence

in future programs. The researchers found offering home visits as a part of the program design helped improve compliance. As a result, the authors suggested offering home visits and individualizing exercise programs as potential mechanisms to improve adherence with future falls prevention programs. One of the ways suggested to individualize programs was to have participants verbalize the perceived barriers to compliance with the fall prevention program and actively helping them find a solution. For example, many older adults report they “need grab bars” but may be limited by their landlord or inability to install the grab bars themselves. By verbalizing these needs, the older adult becomes an active member in solving their own problems.³⁸

Though these components of program design are important, another large facilitator in fall prevention programs has been found to be low cost. A couple of studies found that participants were more likely to make home modifications if they cost less than \$20.³⁸⁻³⁹ Thus, it is ideal for the program design to incorporate an option for home visits with affordable home modification options available for participants.

Lastly, there are discrepancies in the current literature about the optimum duration of balance programs to promote high levels of adherence. Despite these discrepancies, there are trends showing the longer a program lasts in duration, the lower the adherence rate. A systematic review by McPhate et al⁴⁰ suggested that adherence was improved in programs lasting less than 20 weeks with at least 3 sessions a week. Lambert et al³⁸ found programs lasting 6-weeks in

duration on consistent days of the week to be optimal for both positive outcomes and adherence. Participants from this study also expressed frustration with no maintenance or progression interventions available as a part of the program. These participants attended the program, however did not adhere to the program recommendations once they completed the program.³⁸

There are many factors contributing to adherence to fall prevention programs including non-modifiable factors, individual modifiable factors, and programmatic modifiable factors. Fall prevention programs should aim to accommodate these factors to help improve adherence and decrease the number of future falls. One program, called a Matter of Balance (MOB), targets these modifiable factors by incorporating decreased cost, a community-based program, balance exercises, and education to target both body structure and functional impairments as well as contextual factors for falls risk.

Matter of Balance

MOB is an evidence based multifactorial fall prevention program that utilizes cognitive-behavioral techniques to reduce fear of falling and to increase physical activity among community dwelling older adults.⁴¹⁻⁴³ Trained MOB coaches lead 8, 2-hour sessions (taught over 4 or 8 weeks) to facilitate the participants' understanding of their fall risk and overall falls management. The MOB program was designed to benefit community dwelling older adults that have fallen in the past, are afraid of falling, have restricted their activity due to falls

concerns, or those that are seeking to improve their flexibility, strength, and balance.⁴¹ The core elements of the MOB program include (a) participants learn to view falls as controllable through cognitive restructuring and behavioral changes, (b) participants improve their falls self-efficacy and falls management by setting goals to increase their physical activity, (c) participants learn exercises that focus on increasing their strength and balance that will help prevent falls, and (d) participants learn how to make home modifications to reduce their fall risk.^{41,43} Ultimately, the goal of the MOB program is to reduce the fall incidence among participants.

Effectiveness

MOB is suggested to be a beneficial fall prevention program for community dwelling older adults. Smith et al⁴⁴ examined the health related changes among participants (n=1482) that completed MOB in rural and urban areas in Texas. Baseline and post-intervention data was collected through the Falls Efficacy Scale, Health Interference Scale, and a report of the number of days usual activity was limited in the past 30 days. The Falls Efficacy Scale has participants rate how sure they are about their ability to prevent or manage falls, while the Health Interference Scale requires the participants to rate the extent to which their health interferes with daily activities. The study interpreted the findings by comparing the number of times participants improved in one of the measures taken and compared it to the participants who declined in one of the

measures taken; however, the researchers did not focus on the participants who showed no significant change from pre- and post-program. The study found that in urban areas, 3 times as many participants improved their falls efficacy compared to those that decreased their falls efficacy after completing MOB. That is, there were approximately 3 participants that improved their falls efficacy score for every one participant whose falls efficacy decreased. While in the rural areas, 11 times as many participants improved their falls efficacy compared to those whose falls efficacy score decreased. Rural and urban participants reduced their health interference score after participating in MOB. Two times as many participants in rural areas decreased their health interference score, while only three-quarters as many urban participants decreased their health interference score. Change in days limited for usual activity was not statistically significant when examining rural and urban areas independently, but was significant when examined together. Based on these findings, the researchers suggested that MOB was a beneficial fall prevention program for older adults in Texas.

Healy et al⁴³, Tennstedt et al⁴⁵, and Batra et al⁴⁶ also examined the effectiveness of MOB. Tennstedt and colleagues⁴⁵ examined the effectiveness of the MOB program in an RCT when the program was initially led by health professionals. They found a significant improvement in the participants' Falls Management Scale (FMS) score at 6-weeks, 6-months, and 12-months post-program.⁴⁵ In subsequent studies Healy et al⁴³ and Batra et al⁴⁶ found similar results when the program was led by lay leaders. They also identified

improvements in FMS and exercise frequency scores as measured by the modified Physician-Based Assessment and Counseling on Exercise (PACE).^{43,46} Furthermore, the Healy et al⁴³ study found a significant reduction in falls over the course of the MOB program. These quantitative findings suggest that MOB is an effective fall prevention program; however, there is a lack of qualitative research investigating participant's perspective as to why MOB may or may not be effective.⁴³

Volunteer Lay Leaders

The Roybal Center for Enhancement of Late-Life Function at Boston University developed the original MOB fall prevention program with the intention that health professionals would administer the program to the participants.⁴² Although Tennstedt et al⁴⁵ suggested the original MOB program was an effective fall prevention program, it was not widely utilized in practice.⁴³ Therefore in 2003, the Maine Health Partnership for Healthy Aging, Southern Maine Agency on Aging, Maine Medical Center's Geriatric Center, and the University of Southern Maine collaborated to transition the MOB program into a layperson lead volunteer program.⁴² The goal of translating MOB to a volunteer led program was to deliver the program on a larger scale, thus reaching more older adults who are at risk for falling, while maintaining the same effectiveness found in previous studies.⁴³ Healy and colleague⁴³ examined the effectiveness of translating MOB to a volunteer lay leader (MOB/VLL) and found comparable results to a previous

RCT that found the original MOB to be effective for reducing fear of falling as measured by the Falls Efficacy Scale, Falls Management Scale, and Falls Control Scale.^{43,45} Both the MOB/VLL and the RCT found that participants needed to attend 5 of the 8 MOB meetings to make a significant improvement in their falls self-efficacy and falls management scores at the 6-week, 6-month, and 12-month follow-up.⁴³ Therefore, training laypersons to deliver MOB was found to be an effective way of administering the fall prevention program to older adults to assist in decreasing fall risk. As Banez and colleagues¹⁷ discussed, many health professionals view the time commitment to lead fall prevention programs to be a burden since most have full time caseloads. Therefore, MOB led by volunteer lay leaders is an effective way to address this programmatic factor.

Cost

Translating the MOB from a health professional led program to a volunteer lay leader program was an effective transition and has also made MOB an inexpensive fall prevention program. In 2012, a cost analysis of MOB was completed in Southern Florida among 4 agencies that were implementing a MOB at their facility. A survey was sent to the CEOs and program coordinators of each agency participating in the study to retrieve information of the total cost of implementing a MOB program at their facility after the first and second year of the program.⁴⁷ Total cost included program administration, program coaches, marketing, workshop expenses, and training the volunteers. After analyzing the

survey results, the researchers found the average cost of implementation in the first year of the MOB program was \$325 per participant at each site. The average cost to continue the MOB program for a second year after implementation was \$176 per participant.

In contrast, there are many multifactorial fall prevention programs that are still led by health professionals. In 1996, Rizzo et al⁴⁸ examined the cost effectiveness of a multifactorial fall prevention program led by a health professional and found the average cost of the multifactorial prevention program was \$905 per participant. The cost included funds required to develop the program, find participants, train the health professionals in assessment and intervention protocols, office space rental, utilities, and supplies. In contrast, MOB is also a multifactorial fall prevention measure that addresses strength, balance, and home modifications; however, since it is led by volunteers, it is a more affordable option for community dwelling adults. There are limitations to this cost effectiveness comparison between the volunteer led program compared to the health professional led program. The MOB study did not include the cost to develop the MOB program but rather chose to focus on the cost of implementing the program at a new location. Therefore, it is likely that the initial cost of development and implementation is greater than \$325 per a participant; nonetheless, it is likely that MOB is less expensive to implement since the program is led by volunteers and not paid health professionals.⁴⁸

Not only is it important for a health organization to consider the cost of implementing and delivering a fall prevention program, but they also need to consider the cost required for the individuals to participate in the program. Costs associated with participation in MOB include the cost of attending, transportation, and home modification recommendations. The cost to participate in MOB class can vary based on location. The cost to participate in 8-week classes in Minnesota has been found to range from 0-\$50.⁴⁹ The participants also have to consider the cost and means of transportation required to attend the eight sessions since they are often held at community centers or churches. As Yardley and colleagues³⁷ discussed in 2008, participation in a strength and balance exercise program was limited when participants had to commute to a facility rather than complete the exercises within their home. Having a community based fall prevention program, such as MOB, could affect participation in the program; however with MOB, participants learn how to complete the strength and balance exercises at the group session, but are encouraged to complete them on their own on a regular basis. Therefore, participants have the flexibility to complete those exercises at home or at another facility if they prefer.

Within the MOB classes, participants are also given recommendations for how they can modify their home in order to reduce their fall risk. Potential home modifications can include removing rugs, installing grab bars, or improving the lighting. As Lambert et al³⁸ and Ryan & Spellbring³⁹ discussed, participants may be more likely to make home modifications if they cost less than \$20. Therefore it

would be important to include a variety of potential home modifications, especially those with a reduced cost to the participant, in order to improve adherence to the recommendations.

Widespread Implementation

The MOB program is a widely used fall prevention program for community dwelling older adults that are at risk for falls. As of the most recent data in 2011, Minnesota had implemented approximately 45 MOB programs, serving approximately 961 participants that year in 40 counties.⁵⁰ Programs are implemented in a variety of settings statewide including residential facilities, faith-based organizations, health care organizations, and workplaces.⁵⁰ Ory and colleagues⁵¹ examined the effectiveness of implementing a widespread MOB program among older adults (n=3092) in Texas. The researchers concluded that implementing an evidence based fall prevention program can lead to healthy aging via modification of fall risk factors. Immediate follow-up showed improvements in the participants' self-efficacy, physical activity, and overall daily functioning, which is consistent with previous findings regarding the effectiveness of MOB. These findings suggest that implementing MOB on a widespread scale can have an impact on reducing fall risk among community dwelling older adults. Although current research supports the effectiveness of MOB on participants' falls efficacy, further research is necessary to examine long-term adherence to MOB recommendations.

In summary, MOB is a multifactorial fall prevention program that aims to reduce fear of falling and increase physical activity among community dwelling older adults. Quantitative research suggests that MOB is an effective fall prevention program as studies have shown increases in participant's self-efficacy, falls efficacy, physical activity, and overall daily functioning, while demonstrating a reduction in health interference scores. MOB is lead by trained volunteers, which reduces cost and lessens the burden on health professionals. MOB attempts to minimize the cost of participating in the program by offering affordable class rates and a variety of home modification recommendations.

Purpose

Falls are a major issue in society among older adults due to various health conditions, changes in body structure and function, as well as contextual factors, which can be examined using the ICF framework. Single and multifactorial balance programs have been created as a way to target these factors in an attempt to prevent falls. Research suggests that multifactorial fall prevention programs are effective in reducing fall risk as they target a number of modifiable risk factors. However, there is currently a lack of research supporting the best combination or number of factors to address in a given balance program in order to maximize results. Additionally, a lack of participant adherence has been found to limit the long-term efficacy of the programs.

Balance programs are designed to give participants the tools they need to prevent falls with the expectation that participants will use the tools both during and after the program. Adherence during and post-program is impacted by both modifiable and nonmodifiable factors. Programmatic modifiable factors include the program design, cost, and location, while individual modifiable factors include self-efficacy, motivation, social support, and perceived benefits. It is important for fall prevention programs to address the programmatic and individual modifiable factors in order to improve adherence. If participants adhere to the fall prevention recommendations, they are more likely to reduce their fall risk, as well as the physical, psychological, and financial issues associated with falls.

MOB is a multifactorial intervention balance program seeking to prevent falls in an efficient and cost effective way. Trained volunteers lead sessions to help participants view falls as controllable and to improve their self-efficacy through a cognitive-behavioral approach. Education is provided on home modifications and participants learn how to improve their strength and balance through exercises to decrease their fall risk. MOB is a balance program that is widely used in the United States, especially Minnesota. It was chosen for this study over other balance programs because of the evidence supporting how the program helps community dwelling older adults improve falls efficacy, activity participation, and overall health and daily function. Long-term adherence to MOB recommendations has yet to be examined qualitatively. Therefore, the purpose of this study was to examine self-reported outcomes associated with the MOB

program with a focus on participants' perspectives of the program and attention to factors that impact adherence. Specifically, subjects who participated in the HealthEast MOB program completed self-reported outcome measures and participated in focus groups. This was done in order to obtain their perspectives on the program in order to ultimately improve long-term adherence and in order to reduce falls through improved future prevention programming.

CHAPTER II: METHODS

Subjects

Subjects included a convenience sample of healthy community dwelling older adults who were enrolled in a MOB program in the Twin Cities area. The primary investigator attended a scheduled MOB class at 5 separate class locations and explained the purpose and procedures associated with the study. Individuals were then asked to indicate their interest in participating in the study. All those expressing interest were informed of the risks and benefits associated with the research and provided written and verbal consent. All program enrollees were eligible to participate; no exclusion criteria were applied. Twenty-eight individuals from 4 separate MOB class locations agreed to participate.

Research Design and Procedures

This study utilized a mixed methods design that incorporated both surveys and focus group interview data. Prior to data collection for this study, Institutional Review Board approval was granted. Class facilitators administered initial and post-program surveys as part of the regular class process; other surveys were mailed at 6-weeks and 6-months following the program to each participant's home with a self-addressed stamped envelope for return. Participant surveys covered a variety of topics including subjective assessment of general health, fear of falling, number of falls within the past month, exercise frequency, changes made after attending MOB, and whether or not they would recommend MOB to a

friend/relative. The FMS was also embedded within the survey, which utilized a likert scale to explore participant's perceptions of their ability to manage falls. Sample FMS items include "I can protect myself from falls" or "I can reduce falls." Exercise frequency was measured by the Modified PACE. The FMS and Modified PACE were chosen since they have been utilized in other MOB studies. The FMS was indicated to be a reliable measure as evidenced by Cronbach's alpha values from .85-0.87.⁴³ The PACE was initially developed to measure readiness to exercise, but has more recently be utilized as an outcome measure for quantity of exercise. The Modified PACE is a shortened version of the original PACE. See Appendix A for a copy of the pre-program survey used for this study. For most survey items, participants rated each question on an adjusted likert scale depending on the question, in order to best match their current beliefs. For example, participants were asked to rate their general health as poor, fair, good, very good, or excellent on all 4 surveys (pre-MOB, post-MOB, 6-weeks post-MOB, and 6-months post-MOB). Survey answers were then coded numerically as follows: 1= poor, 2= fair, 3= good, 4=very good, 5=excellent.

For the focus groups, researchers contacted the participants using their documented preferred method of communication at 6-months post-program completion to engage in a 60-minute focus group. The focus groups were led by the principal investigator, who was experienced with this methodology and has a publication record that includes research conducted with surveys, interviews, and focus groups. Student researchers were also present to assist with the semi-

structured interviews. The questions of the focus groups were directed toward learning more about participant's experiences and were guided by the questions listed in Table 1. Supplemental follow-up questions were also asked for further clarification. Participants were given the opportunity at the end of the focus group to reaffirm or retract their quotes once the session was transcribed.

Table 1: Semi-structured interview questions asked during focus groups.

| |
|---|
| 1) What motivated you to attend the "A Matter of Balance" classes? |
| 2) What were your expectations of the classes? |
| 3) What aspects of the program were most helpful? Least helpful? |
| 4) Did you make any changes as a result of the program (e.g. physical activity, exercise, home modifications, behavior, or attitude changes)? Why or why not? |
| 5) If changes were made, what were those changes? |
| 6) Were there any recommendations that you chose not to follow? If yes, why did you decide not to follow them? |
| 7) What motivated you to make changes? What barriers to change, if any, did you encounter? |
| 8) Is there anything else you would like to share that we have not asked about? |

Data Analysis

Participant surveys were translated from paper forms and entered into IBM SPSS Software, version 22 (IBM Corp, Armonk, New York) for analysis. In the instance that a survey item was marked with 2 or more answers, or was left blank, the data entry was also left blank. Demographic characteristics were summarized using descriptive statistics. Most other quantitative data was

analyzed with a repeated-measures ANOVA. This analysis included only those respondents for which there was complete data for each time point. For those items with a significant F-value ($p \leq .05$), pairwise comparisons with the Bonferroni Correction were performed. Lastly, paired sample t-tests were used to analyze questions concerning fear of falling at 6-weeks and 6-months post-program.

The qualitative data from the focus groups were transcribed. Then, researchers used a constant comparative method to describe, code, and group the data to identify categories and themes throughout the interviews. The coding process was performed individually and then compared in a collaborative group meeting in order to find consensus on common themes. Any theme that the group of researchers did not agree to was not included in this report. Researchers then individually looked at participant quotes throughout the focus groups to confirm or edit identified themes and categories. Collectively, the researchers reorganized the themes and condensed the categories as necessary. Credibility was established through skillful interview technique and detailed evidence. Dependability criteria were met through member checking, having multiple researchers analyze the data, and peer debriefing throughout the process.

CHAPTER III: RESULTS

Subjects

A total of 27 community-dwelling older adults participated in this study, 5 of which were male and 22 were female. The age range of the participants was 73-90 years old, with an average age of 79 years. All but 2 respondents (92.6%) completed at least 1 of the surveys and a total of 19 participants completed all 4 surveys, for a response rate of 70.4%. Of the 27 participants that initially filled out surveys, 11 attended a focus group at 1 of 4 different locations.

Quantitative Results

The average baseline general health rating was between good and very good (3.41). At the 6-months post-program survey, the average general health score was slightly less, however remained between good and very good (3.26). This was not a statistically significant decrease in general health.

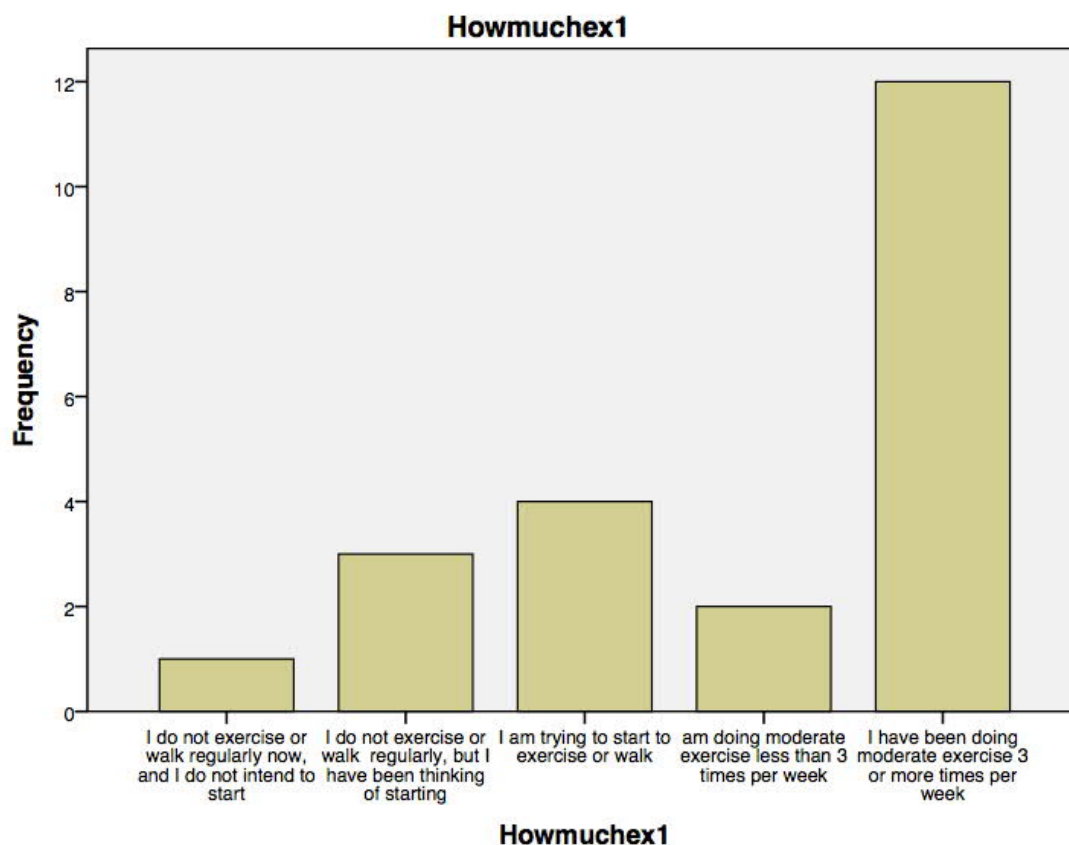
Participants were also asked how many falls they had experienced in the past month. Twenty of the 27 participants responded to this question in the first survey and 70.0% of participants reported no falls, 25.0% reported 1 fall, and 5.0% reported 2 falls. At the 6-month post-program survey, 24 participants responded and 70.8% reported no falls and 29.2% reported 1 fall. This was not a statistically significant change in number of falls. Participants reporting a fall were also asked if any of their falls resulted in injuries and if so whether the injury was

mild/moderate or severe. At the 6-month post-program survey, 6 participants noted that a fall resulted in an injury. Five participants indicated that it was a mild injury such as a bruise or cut and 1 participant indicated a severe injury such as a broken bone or head injury.

Participants were also asked to rate how afraid they were of falling by selecting not at all afraid, somewhat afraid, very afraid, or extremely afraid. Data for this item was collected at the 6-weeks and 6-months post-program. Twenty-three participants responded to this question at 6-weeks and 17.4% implied they were “not at all afraid” while 82.6% indicated they were “somewhat afraid”. Twenty-one participants responded to the 6-months post-program survey and 28.6% indicated they are “not at all afraid”, 66.7% indicated they were “somewhat afraid”, and 4.8% were “very afraid”. There was no statistically significant difference in fear of falling between the 6-weeks and 6-months post-program surveys.

Participants were also asked to indicate how much exercise they participant in on a weekly basis. Twenty-two participants answered this question at baseline; 54.5% of those that responded indicated that they exercised 3 or more times a week. For complete data on exercise at baseline, see Figure 3. At the 6-month post-program survey, 23 participants responded to this question and 60.9 % indicated they exercised at least 3 times a week. This increase was not statistically significant.

Figure 3: Reported frequency of exercise at baseline.



When the FMS was analyzed as a whole, no statistically significant difference was found. However, when the 5 items were analyzed individually, a statistically significant differences were found for the items “I can find a way to reduce falls” ($F=6.11$, $p=.006$) and “I can protect myself if I fall” ($F=4.28$, $p=.024$). Specifically, for the item “I can find a way to reduce falls” significance was found between the ratings at baseline and 6-weeks post-program ($p=.049$) and the ratings at baseline and 6-months post-program ($p=.002$). For the survey item “I can protect myself if I fall” statistically significant differences were identified

between baseline and the post-program survey ($p=.015$) and baseline and the 6-month post-program survey ($p=.022$). The survey item “I would recommend this class to a friend or relative” showed a significant decrease ($F=5.65$, $p=.016$) between post-program surveys and 6-months post-program ($p=.027$). The means and standard deviations for each item at all 4 data points are provided in Table 2 below.

Table 2. Summarized survey data across all time points.

| Survey item M (SD) | <i>Baseline</i> | <i>End of Program</i> | <i>6-weeks post-program</i> | <i>6-months post-program</i> |
|--------------------------------------|------------------------|----------------------------------|--|---|
| General Health | 3.33 (.77) | 3.50 (.71) | 3.33 (.59) | 3.17 (.62) |
| Fall interference | 3.94 (1.3) | 3.94 (.94) | 4.06 (.73) | 4.28 (.96) |
| I can find a way to get up if I fall | 2.83 (.99) | 2.89 (.90) | 3.11 (.90) | 3.05 (.94) |
| I can find a way to reduce falls* | 2.53 (.70) | 3.11 (.81) | 3.21 (.71)* | 3.42 (.77)* |
| I can protect myself if I fall* | 2.06 (.83) | 2.88 (.86)* | 2.71 (.77) | 2.71 (.85)* |
| I can increase my physical strength | 3.00 (1.03) | 3.28 (.83) | 3.06 (.73) | 3.11 (.96) |
| I can become more steady on my feet | 2.94 (1.00) | 3.19 (.91) | 3.19 (.91) | 3.06 (.85) |
| Number of falls in past month | .36 (.63) | .43 (.51) | .21 (.80) | .35 (.50) |

| | | | | |
|--|-------------|-------------|-------------|-------------|
| How much are you walking or exercising now | 4.33 (2.06) | 5.44 (1.01) | 5.66 (.71) | 5.22 (1.3) |
| As a result of this class I feel more comfortable talking about my fear of falling | NA | 3.57 (.51) | 3.35 (.63) | 3.43 (.51) |
| As a result of this class, I have made changes to my environment | NA | 3.19 (.40) | 2.94 (.57) | 3.00 (.52) |
| As a result of this class, I feel more comfortable increasing my activity. | NA | 3.63 (.50) | 3.44 (.51) | 3.38 (.81) |
| As a result of this class, I plan to continue exercising | NA | 3.80 (.41) | 3.47 (.52) | 3.33 (.82) |
| I would recommend this class to a friend or relative* | NA | 4.00 (0) | 3.69 (.48) | 3.63 (.50)* |
| Fear of Falling (Health East question) | NA | NA | 1.83 (0.38) | 1.78 (0.55) |

*Significantly greater than baseline at $p < .05$

Qualitative Results

Qualitative analysis of the focus group data resulted in 1 major overarching theme of awareness that interconnected with 5 additional major themes each with several sub-themes. These themes included: motivators to attend, class learning environment, current adherence, facilitators for adherence, barriers for adherence, and changes for future programming. All major and sub-themes will be discussed in more detail in their associated sections.

Awareness

Awareness was an overarching theme that emerged as an important component of the themes: motivators to attend; class learning environment; current adherence; and facilitators for adherence.

Participants entered the program with an initial awareness of a potential balance impairment and/or community center class offerings which lead them to sign up for the MOB classes. Once enrolled in MOB, participants reported an increased level of awareness through learning about what aspects of balance they could improve. After the class ended participants utilized their awareness to make changes from program recommendations to increase their activity level or make changes in their home. Awareness seemed to facilitate long-term adherence as many participants reported the biggest change they have noticed in their lives after completing the MOB program. As such, awareness will be discussed as it relates to the other themes identified below.

Motivators to Attend

The second theme was motivators to attend the MOB program. For this theme, awareness was related to recognition of a health or balance impairment creating an interest in the course and familiarity with the community center and class site location. The reasons participants chose to attend MOB fell into several sub-themes, which consisted of change in health status, peer support, and access and location.

Change in health status. Participants were likely to enroll in MOB if they had a recent medical diagnosis or experienced a recent fall. These participants indicated that they were more aware of their impaired balance and wanted to make improvements. For example, participant 5 described, *“I had been diagnosed with Meniere’s disease... I had some extreme dizzy spells. They were horrible...so my balance is not the best. So that’s what attracted me.”* Participant 10 recounted her history of falls that provoked her to enroll in the course, *“I’ve had three bad falls... So [that] made me want to really look at the issue of balance.”*

Not all participants had experienced a fall but instead decided to join due to concern about impaired balance and likelihood for falls due to their age. Some participants noted that they were more aware of these changes in their peers who would describe their own poor balance. Participant 1 stated, *“Because I don’t want to fall... at eighty you have friends who fall all the time and I didn’t want to be one of ‘em”*. Some participants signed up for MOB because of their interest in learning exercises for balance. These participants perceived that learning and doing the exercises from MOB would improve their strength and balance

Peer support. Some participants joined in support of their peers. Amongst focus group participants, family ties were the reason for several couplets of participants to sign up. In these cases, 1 member of the couplet tended to be the initiator. The initiator can follow 2 patterns, either they are concerned for their

own balance and the other member follows, or they are concerned for their family member's balance and they join in support them. The latter was exemplified by participant 3 who explained, *"So I registered her...I wanted her to go and I knew she wouldn't do it unless I came"*.

Access and Location. Lastly, access and the location of the MOB program offering was influential in many of the participants' decision to sign up and attend the program. Participant 10 remarked, *"It helped that I could take it here and didn't have to drive some other place where I didn't know where I was going."* Familiarity of the community center offering the class may have been a factor in participant's awareness of program offerings but also contributed to likelihood in attending.

Class Learning Environment

The third theme was class learning environment. In the theme of class learning environment, increased awareness was established as participants learned about how their peers had fallen and how those falls may have been prevented by sharing ideas and tips of things that may have been helpful from their own experiences. The effect of group interactions and peer learning was an influential aspect of the program that many participants appreciated. Participant 7 summarized, *"...everybody that was there was there because they had a concern, and they had an interest in their own ability to have better balance. And so it was a very open group, that people were more than willing to share."* Overall

participants were very pleased with suggestions by other group members in addition to the specific suggestions provided as part of the MOB program.

Participant 7 also commented, *"I think our group interaction was wonderful, and different people had different experience with... falling, in their homes, what they've done to protect themselves, [and giving] suggestions."*

Group instructors were also an influential aspect of the MOB program.

Participants commented on the professionalism of the instructors and knowledge they offered. Participant 4 noted, *"And they had a fellow from Minnesota Aging Society...He came and talked a little bit about different things that were available and some people brought in their own equipment that they used. Like the kneeler that you use for garden work that you flip up and either sit on it or kneel on it."* In addition, MOB programs typically bring in a guest lecturer, such as a physical therapist for 1 of the MOB sessions. Participants commented on the value of the physical therapist's expert advice and the awareness of adaptive equipment available for daily living tasks, assistive devices, and methods for getting up after a fall.

Lastly, the class format was influential in participant's learning and carryover of information. Participant 4 stated, *"I liked a lot of the repetition. 'Cause they would talk about things [respondent 1 agreed] and then the next day, or next week, they would review what we talked about the week before. And I think for some of us, that repetition is just good."* The time spent reviewing content and exercises from previous classes seemed to reinforce the information

and resulted in further learning and awareness amongst the participants.

Additionally, participants commented throughout the focus groups about the benefit of multimodal presentation of information via speakers, videos, and peer discussion that matched different learning styles.

Current Adherence

The fourth theme addressed participants' current level of adherence and included 2 sub-themes, exercise and the environment. The main aspect from the MOB program that participants continue to use is awareness. Through increased awareness participants know exercises they can do to improve their balance. Additionally, participants were made aware of their environment in the community as well as changes they can make to their environment for overall prevention of falls.

Exercise. Participants who adhered to exercise recommendations reported both individual activities and participation in group fitness classes. Some of the participants made comments about how increased awareness helped them do more exercises throughout their day. For example, participant 5 reported incorporating exercises into her daily life stating, *"That's it. You don't have to do all of them. If you're sitting here like this, go ahead, do the ankle rotations. I find myself doing them all the time"*. Many of the participants were involved in their community center prior to the MOB class. Through these community centers, there are other exercise classes including SilverSneakers and an aerobics class.

Participant 7 shared, *“Well, one of the things that I was delighted about is there’s a SilverSneakers class here, and a lot of the exercises are what we do in class...I take three days a week, so it was already kind of built in”*. A few participants mentioned being involved in these classes for continued accountability and exercise after the MOB class. Other participants explained that they still did a couple of the exercises that they found most beneficial. The MOB class helped participants learn how to incorporate the exercises into their everyday life, for example performing a seated exercise during a television commercial. As participant 5 reported, *“Move our feet in circles when we’re sitting there watching TV. There’s a lot of them that you can just do sitting. So, yeah, we did add some of those that you don’t have to be doing it for a half an hour”*.

Changes to their environment. Participants from all of the focus groups made comments about how they continue to be more aware of their surroundings both in the community and in their own homes. Participant 10 explained, *“I’m much more cautious...And when I’m out walking, I’m very conscious of the uneven sidewalk...I am much more aware of my surroundings.”* Participant 3 reflected, *“My daughter moved the laundry room from the basement to the first floor. So I don’t go down the stairs”*.

Lastly, participants reported that educational components of the program made them more aware of changes they could make to their own environment for increased safety. Participant 4 explained this saying, *“Like I mentioned before, I think it was really important how much the emphasized changing your*

atmosphere and environment. You know, that you have things accessible and more wisely use your space. So that you don't have to put yourself at risk".

Participants from most of the focus groups also made remarks about making changes to their physical environment. These included altering lighting, removing rugs, and rearranging kitchen cupboards so that heavy and frequently used dishes were not as high up. Participant 7 changed her lighting, stating, *"...I did put... a nightlight down in my living room area...I think I've been more aware of lighting and it's the usefulness of it"*. Participant 3 made changes in her kitchen, explaining, *"The silliest thing I think of is, you know, an old set of dishes, all them plates. I thought, every time I have to keep picking them up. So I took about half of them and put them up on a shelf which I'm not going to go and get 'em down. But I got enough to feed the people what I'm having now. At least I don't have to be taking down 8 plates or whatever"*. Others found it helpful in the MOB program to discuss ways to be safe in the community such as using grips on their shoes when it is icy outside and being more careful on uneven sidewalks.

Facilitators for Adherence

Facilitators for implementation of recommendations from the MOB program were grouped as reasons that participants adhered to program suggestions after the sessions ended. In this theme, awareness was established as participants learned ideas for how to incorporate exercises into their daily life.

These facilitators included: incorporating exercise into their existing routine, peer support and accountability, and body structure and functional changes.

Incorporating exercise into their existing routine. Incorporating the exercises into existing routines or activities seemed to be the easiest way for participants to integrate suggestions from class. Participant 4 explained how they integrated exercises into their routine saying, *“So, I figured I can do quad sets and things like straight leg raises while I’m just sitting and watching TV or whatever”*. Additional participants described adding balance-specific exercise from MOB into their regular exercise routine to increase their focus on improving balance.

Peer support and accountability. The influence of peer support to boost accountability and follow through with class suggestions was also an important facilitator. Participants noted that group support was a factor in ensuring their attendance during the class but also to follow up with recommendations after the class ended. Participant 1 remarked, *“Because I’ve got a bunch of people sitting next door that will tell me, ‘Why weren’t you here last week?’”*.

Body structure and functional changes. Lastly, as MOB sessions progressed, participants were able to observe body structure and functional changes that helped to facilitate further adherence to recommendations. Participants noted both physical and mental changes after finishing MOB. Participant 2 noted, *“...I think the course initiated changes in the body which allowed me to do more things... and I’m not sure if they would have happened*

without the course...” Participant 10 noted clarity in her thinking and a better understanding of balance with her ability to make changes, explaining, *“Especially the first class, talking about balance itself and about looking out for problems, and I found that very, very helpful... for me... it was better than the exercises. For me, it was this is what’s happening. This is how it’s happening. This is why it’s happening.”*

Barriers for Adherence

There were 3 main barriers focus group participants in the MOB program reported. They included the number of exercises, a lack of motivation, and difficulty changing habits.

Number of exercises. While some participants found ways around this, such as typing up a few of the exercises they preferred or doing only the exercises they enjoyed the most, others did not do the exercises altogether. Participant 10 reported, *“It kind of overwhelmed me, all the different exercises...it sort of keeps you from even starting, you know, but that’s a little lazy excuse, but it’s the truth.”* Others in the group verbally agreed with this statement but did not elaborate further.

Difficulty changing habits. Participants also reported difficulty changing their habits despite increased awareness and knowledge from the MOB program. Participants wanted to adhere to the recommendations, but as participant 3 explained, *“It’s like anything else. Any habit that we develop. You have a specific*

time to do it and that's the time that we do it. But we don't do that. It's whenever we can slip a few minutes here and there. If we're thinking about it we'll do it, if not, we'll grab the book and read a book". The pull of habit made it difficult for patients to remember to do the exercises once they were no longer in the group. Participant 7 stated, *"Yeah, I think it's out of sight, out of mind and not having the opportunity. If somebody told me here ...they were going to do these exercises on a certain day, I'd probably come, you know, but on my own [?]"*. Lastly, other participants attributed their difficulty with changing habits to their own stubbornness. Participant 3 explained this saying, *"But, sometimes it's a little bit difficult to surrender. To let somebody else help you do something. When it is like I can do it myself...Yeah. And like I say, it was, for me it was a big thing to ask somebody else to do something for me because...I should have a label on me that says 'stubborn old lady' because I am and it just drives me crazy when they think I can't do somethin'. I can do that if I want to".*

Despite increased awareness, participants reported difficulty adhering to recommendations for exercise long-term due to decreased motivation. This was a theme throughout each group. Participant 2 expanded on this concept, *"Well for me, I enjoyed the exercise portion of it. You know, that reinforcing it every other day or twice a week. While we were taking the class I did it. Now that we're not taking the class, I don't do it"*. Participant 9 admitted to this lack of motivation reporting, *"...as with anything in my life, I learn things, and I think how good it is, and then I really fail to put it into action"*. Similarly, participant 10 explained, *"So*

what holds you back? My bad habits, my attitude, a lack of commitment, you think you cannot do it well enough” and participant 1 reported, *“It’s easy to find excuses not to do something”*.

Changes for Future Programming

Though the participants in these focus groups found the MOB program to be helpful, they also had a few program specific changes for the future. These ideas for change included 3 subthemes consisting of providing a follow-up class, options for practice for all skill levels, and organization.

Follow-up. Participants in each of the focus groups agreed they would have preferred to have a follow-up option once the course was over. The mentality of “out of sight, out of mind” with regard to exercise was the number 1 reason participants felt the need to continue with some sort of course. Participant 2 commented, *“Well, when the class was done, I mean, it was done. There was no follow-up whatsoever. And there shouldn’t be. I mean we’re adults. We should be able to do it on our own. Unfortunately, we watch TV instead of exercise”*. Participant 9 agreed saying, *“I think this follow-up session is a very good idea because it brings it back into our heads, you know”*.

In addition to wanting follow-up and opportunities for classes like MOB for all people at all levels, a few participants agreed they wished their health care providers, mainly physicians and physical therapists, had talked with them about this class. If a health care provider had mentioned it sooner, they may have

participated sooner. One participant explained how well the program matched up with what she was learning in her physical therapy, which helped reinforce her learning of certain topics. Another participant commented about a physical therapist who came in to speak with the class as a guest speaker. They reported, the participants benefitted from this as the physical therapist was able to speak from experience and give helpful tips.

Practice for all skill levels. Additionally, a few participants mentioned they feel they would have gotten more out of the program if they had the opportunity to practice some of the skills, for example, how to get up when you fall. Participant 10 reflected, *“The class had somebody show us how to get up, but -- and I suppose it would not work if you had everybody try it, but I wish that I knew better how to get up after I have fallen.”*

Others explained the class was only available to a limited population, as those with a decreased level of function were not able to participate. Participants inquired if there was another class available to those older in the community who may have other additional impairments that may limit them from participating in the MOB class. Participant 8 explained, *“Just that one gentleman who had a caretaker, and they eventually asked him to leave because he just couldn’t do any of the exercises or anything on his own, and it was -- just became a burden for the instructors to try to carry the group and the exercise and demonstrate and walk us through the exercise and try to help him on an individual and his caretaker just left and went outside.”*

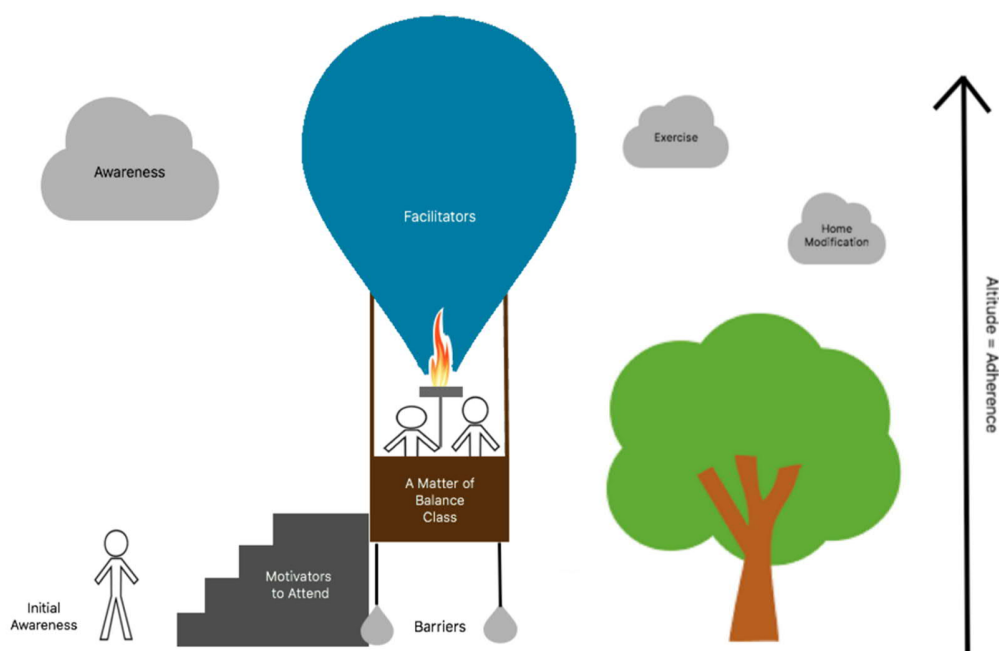
Organization. Lastly, the majority of the focus group participants remarked about the organization of the booklet they were given at the start of the class. They exercises were throughout the booklet and thus felt unorganized. Participant 1 suggested, *“That’s why I was wondering if the exercises were something, a section you could take out and look. So you just have, I think it’s four pages instead of the twenty or twenty-five.”* Others in the group commented about how the booklet felt scattered or repetitive.

CHAPTER IV: DISCUSSION

Together, the qualitative and quantitative results of this study can be further explained using the metaphor of a hot air balloon (Figure 4). Participants demonstrated an initial level of awareness which included awareness of their personal need and of MOB class offerings. This initial awareness is represented by the figure standing at ground level. As a result of this initial awareness, participants were motivated to attend the class. This motivation is represented by the stairs. Participation in the class is represented by the basket. The peer support and group learning environment are illustrated by including multiple people in the basket. As a result of program participation there was enhanced awareness as illustrated by the flames. Facilitators of adherence are represented by the balloon while barriers to adherence are represented as the sand bags. Given these facilitators and barriers, ultimately, it was up to each participant to find the motivation to actively pull the cord and let the balloon take flight. Each participant's current level of adherence is represented by the altitude of the balloon. If a participant does not take action and pull the cord to apply their awareness, then the balloon will stay at tree level. However, if they pull the cord, the altitude of the balloon is increased above the trees suggesting an increased level of adherence. At this altitude, changes participants made are represented by the clouds and include exercise habits, home modifications, and increased awareness. The largest cloud represents awareness as this was the most

common change participants reported on both the surveys and in the focus groups. Components of the hot air balloon metaphor and the relationship of these findings to those of other researchers will be discussed below.

Figure 4. Illustration of integrated qualitative themes.



Stairs (Motivators to Attend)

Motivators to attend the class are represented by the stairs and include access and location. The qualitative data in this study revealed that participants appreciated the familiarity of the program location. In contrast to this finding, some researchers have suggested that adherence rates were improved when fall prevention programs were based out of a participant's home.³⁸ It is possible that

people who preferred a program in their home did not elect to participate in the MOB program and therefore, were not included as study participants. It is difficult to determine optimal location since the participants in this study were already active members in the community center. For future studies that implement a fall prevention program in a community setting, it could be beneficial to incorporate a more widespread recruitment approach and offer MOB at various settings. Yardley and colleagues²⁸ reported that recommendations made by healthcare professionals had a larger impact on older adults willingness to participate in balance programs, such as MOB. Therefore, a possible suggestion would be to utilize more physician and health care professional referrals to target individuals who may not be aware of fall prevention resources.

Furthermore, our results suggest that the MOB program could improve recruitment to target the participants who would most benefit from a multifactorial program. It is likely that the individuals who participated in this study may not represent those at the most risk for falls as they were already active individuals, which was supported by the qualitative and quantitative findings. Qualitatively, participants reported attending fitness classes, such as SilverSneakers, on a regular basis at their community center. Quantitatively, 54.5% of participants reported exercising 3 times a week or greater. Therefore, it would be beneficial to recruit individuals who are less active since they may have more of a need for a program like MOB. One method would be to build off the strong influence of peer support as it was found to be a strong motivator for enrollment and a facilitator for

adherence. One recommendation would be to create an incentive for participant referrals to new enrollees, an opportunity to bring a guest for the day, or facilitate a support group for post-program exercisers.

Multiple People in the Basket (Peer Support)

Peer support was addressed qualitatively as a motivator to attend the program, a beneficial part of the class learning environment, and a factor that would promote adherence to continuing with the exercises after the program ended. Data from this study revealed participants registered for MOB with support from family and friends which is in agreement with the work of Yardley et al.²⁸

Participants mentioned feeling as though others in the group were holding them accountable helped keep them participating in the program each week and following through on their exercises during the program. Additionally, some participants found they were able to continue with the exercise recommendations through group fitness classes or other means outside of the program in their community, although not necessarily with the specific exercises given in the MOB class. This contradicts the findings from a study by Yardley et al²⁷ in 2007 in which participants reported an increased likelihood of adherence to program recommendations following completion of a balance program if there were things that could be done in the home rather than exercises in the community. Thus, this is an area for future research. It may be that more active adults, such as

those in the population of this study, are more likely to continue exercise in their community for increased social support; whereas adults with more balance impairments or those who report a higher fear of falling at baseline may prefer exercise they can perform in their own home as the burden of leaving the home may outweigh the social benefits of exercising in the community. Additionally, participants from this study reported the MOB program allowed them to make a contribution to their communities by helping their peers prevent falls through sharing what they learned and by recruitment into the program. This suggests, there is a need for some sort of social community and support following the program in order to increase overall adherence. There is currently little to no literature that has looked specifically at the impact of social support and its impact on long-term adherence to program recommendations. Current literature only supports the need for a social community for improved program adherence.³² However further research is needed to see if participants would participate in a follow-up group and find improved long-term adherence. Unfortunately, older adults have reported low levels of social support for exercise and vigorous activity as they continue to age.^{20,33-34} This suggests there is a need for increased education, awareness, and support within the community in order to encourage older adults to participate in programs like MOB and adhere to program recommendations upon the completion of the program.

Flame (Enhanced Awareness)

Increased awareness was a significant theme found in both the qualitative and quantitative results of this study. Qualitatively, participants in multiple focus groups reported a major take away from the class was increased knowledge about how to prevent falls through both home modifications and exercise. In addition to this, quantitatively, 2 of the 3 significant results found were related to the questions “I can protect myself from falls” and “I can reduce my falls”. These responses suggest there may be some link between awareness and self-efficacy. As participants gained knowledge, they also gained understanding and thus felt they had the skills and tools to protect themselves from falling and reduce the overall number of falls. This reflects concepts of self-efficacy that were seen in the literature.²⁹ This is important because if patients believe they can prevent and reduce their number of falls due to increased self-efficacy, they will have a decreased fear of falling and therefore overall fewer fall-related injuries.² By improving self-efficacy, we can thus hopefully break the cycle of frailty by preventing older adults from entering the cycle.³

It is interesting, that though participants reported qualitative and quantitative improvements in their overall awareness and self-efficacy, the number of falls did not show a significant change. This may be due to a generally healthy population at baseline, as many of the participants did not report falls in their initial surveys. Many of the participants reported other reasons such as aging and changes in their overall health as reasons for joining MOB.

Additionally, the qualitative and quantitative data analyzed was only completed for participants who completed all surveys or who attended a focus groups. In doing such, there were some participants who were not included into the data due to lack of follow-up. This study did not track the dropout rate, reasons for dropping out, and may not have received surveys from a representative population. For example, a participant may not have attended a focus group and dropped out of the program after falling and experiencing an injury.

Balloon (Facilitators)

Participants appreciated the multifactorial nature of MOB's fall prevention approach. Specifically, the variety of educational and peer learning components were valued. Participants from each of the focus groups at varying levels of motivation and self-efficacy found the educational components of the MOB program to be beneficial. Motivation and self-efficacy appeared to improve through education and were further enhanced through peer learning. As a part of the MOB program, the participants discussed things they have done or have heard about to help such as removing rugs from their household, adding night lights to their bedroom and bathroom, and using different footwear for icy weather. Yardley et al²⁸ found that social support from family, friends, and program instructors helped motivate participants to attend by giving practical help and emotional support. Thus, education both formally with an instructor and in a

peer-learning context should continue to be incorporated into fall prevention programs.

Sandbags (Barriers)

Though most participants reported increases in self-efficacy, other participants found this to be a limiting factor to their adherence to long-term recommendations. One example was from participant 11 who explained this conflict between self-efficacy and adherence saying, “So what holds you back? My bad habits, my attitude, a lack of commitment, you think you cannot do it well enough...”. This statement links concepts of self-efficacy and motivation from a negative perspective. For example, the participant did not believe he could do the exercises well enough, which affected his level of commitment and a poor adherence to program recommendations. This suggests there may be some link between self-efficacy and motivation. Yardley et al²⁷ describes this in a study in 2007 explaining self-efficacy is essential to initiate a behavior, such as joining and participating in MOB, whereas self-regulation is important to sustaining a behavior, such as long-term adherence to MOB program recommendations. In this study, results suggested if a participant does not have a high self-efficacy related to a skill set, they are less likely to be motivated to participate in it or visa-versa. Many of the participants in the group had the motivation to attend the program and participate in the class. Though their participation in the class would

suggest our participants had high self-efficacy, their motivation did not appear to carryover beyond completion of the program into long-term adherence.

Several participants commented on the format of exercise suggestions as a potential barrier to uptake of recommendations. Some suggestions from participants were to change the organization of the exercise booklet so that they could be torn out, instead in the middle of a booklet where they were easily forgotten.

Beyond organization, the exercises that MOB delivers are widespread to address various age related balance impairments. Some participants reported feeling overwhelmed by the number of exercises they were given, while others felt they needed more hands on practice with some of the skills related to falls. Due to the number of exercises, some participants may have found it difficult to initiate a new routine with all the new class suggestions. Though current literature does not currently specify the ideal number of exercises, Lambert et al³⁸ does suggest individualized exercise programs to help decrease the number of perceived barriers for long-term adherence to program recommendations. These researchers suggest giving participants the opportunity to verbalize their needs in order to become an active member in solving their own problems. Additionally, Dickenson et al³⁵ found in semi-structured interviews that participants were more likely to adhere to a program if they saw how the exercises were relevant to their needs. As it relates to MOB, individualizing exercises may include specifying

what each exercise aims to improve so that participants can select the exercises relevant to them.

Pulling the Cord (Transfer of Knowledge/Awareness)

The transfer of knowledge, when a person internalizes program recommendations related to falls demonstrating increased knowledge and understanding³⁶, was a concept throughout the literature. Qualitatively, the participants who continued with the exercises reported they had incorporated them into their everyday lives. This is directly related to increased awareness, as many of these participants did not know they could participate in various exercises and home modifications with simple changes, such as performing an exercise on the couch during TV commercials. This transfer of knowledge has been found to be a critical component to fall prevention programs as it leads to increased adherence to recommendations and thus should decrease the number of falls in older adults. By continuing to increase awareness through education, it is assumed there will be a greater increase in participants who reflect this concept of understanding and thus apply the information to their own lives. This is an area that needs further research as it is a fairly new concept and may require a study design different than the design of this study.

On the other hand, a lack of transfer of knowledge was also found to be a major barrier to adherence for MOB recommendations. At the time of the focus group, this subset of participants lacked the transfer of knowledge from

suggestions to implementation, which resulted in decreased adherence. Motivation and pull of habit were influential barriers that resulted in lack of knowledge application, however, this did not seem to detract from their awareness as many participants spoke about and still maintained knowledge of class suggestions.

Current Level of Adherence (Altitude)

Focus group participants felt their current level of adherence would have improved with follow-up sessions or a maintenance program. However, further research is needed to investigate the efficacy of this type of intervention and its impact on adherence. The surveys in this study did not inquire about participants' perspectives on optimal length of the program. However, there was mixed literature on the optimal length of a fall prevention program as a study by McPhate et al⁴⁰ suggested a program less than 20 weeks was ideal, while a study by Lambert et al³⁸ suggests a 6-week program demonstrated improved adherence rates. Participants in the study by Lambert et al³⁸ also expressed frustration with a lack of maintenance or progression of interventions upon the completion of the program. Similarly, it appears that the participants that were involved in this study would have preferred a program that was greater than 8-weeks as many stated they wanted a follow-up option after MOB was finished. The participants did not state that they wanted the MOB class to be longer necessarily, but rather a place to practice what they have learned while keeping

each other accountable for adhering to the recommendations outside of the formal program. If the program offered a follow-up program for participants it would be beneficial to study the attendance of a program like this in addition to its impact on participant's long-term adherence.

Clouds (Changes Made by Participants)

At follow-up, changes that the participants reported included exercise habits, home modification, and increased awareness. These changes were in alignment with the 4 core elements of MOB which were: participants will (a) learn to view falls as controllable, (b) improve their falls self-efficacy and management (c) learn strength and balance exercises and (d) learn how to make home modifications.⁴³ This overlap further supports the program's effectiveness. Similar to previous literature, participants from our study identified motivation, social support, perceived benefits and incorporating the exercises into their daily routine as the most influential factors facilitating level of adherence.²⁸⁻²⁹

Comparisons to Other MOB Studies

The results of this study were comparable to other MOB studies. Although certain FMS variables showed significant improvements in our study, observed changes in the FMS and total PACE scores over time were not found to be statistically significant. As previously mentioned, the Healy et al⁴³ and Batra et al⁴⁶ studies demonstrated statistically significant improvements in both of these

measures at follow-up. Figure 5 represents the changes in FMS score for this study, and both the Healy et al⁴³ and Batra et al⁴⁶ studies. Both of these studies identified significant improvements in the FMS at 6-weeks post-program^{43,46}, while only the Healy et al⁴³ study found significant improvements at the 6-month post-program. For this study, the initial FMS score was higher at baseline than the other 2 studies. It increased by more than the Healy et al⁴³ study, but less than the Batra et al⁴⁶ study; however the mean change score for the FMS in this study (0.35 on a 4-point scale) was comparable to both of these studies.^{43,46}

Figure 6 represents Modified PACE scores for this study, the Healy et al⁴³ study, and Batra et al⁴⁶ study at the initial post-program survey, 6-weeks post-program, and 6-months post-program. As the baseline PACE score shows, participants in all 3 studies were active individuals. Although our study showed the greatest mean PACE score increase, it was the only one that was not significant. The lack of statistically significant findings in this study may be attributed, in part, to sample size differences. Our study only had 27 participants, while the Healy et al⁴³ study had 335 subjects and the Batra et al⁴⁶ study had 160 subjects. With larger sample sizes, these studies had more power and a reduced likelihood of making a type II error.

Figure 5. FMS Comparison across Matter of Balance studies.

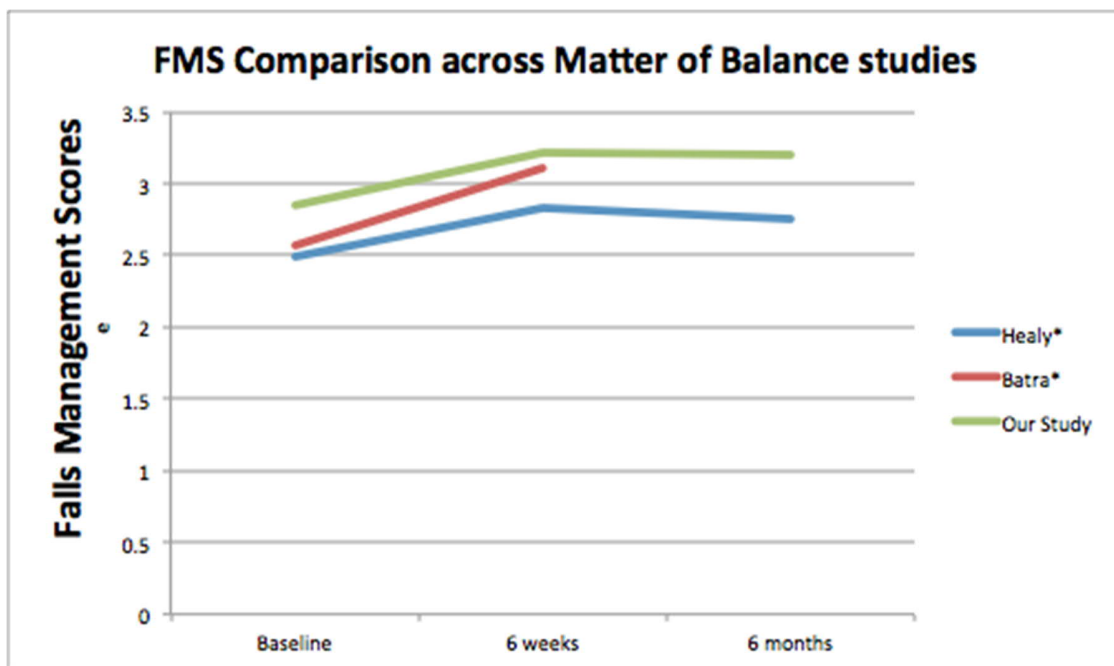
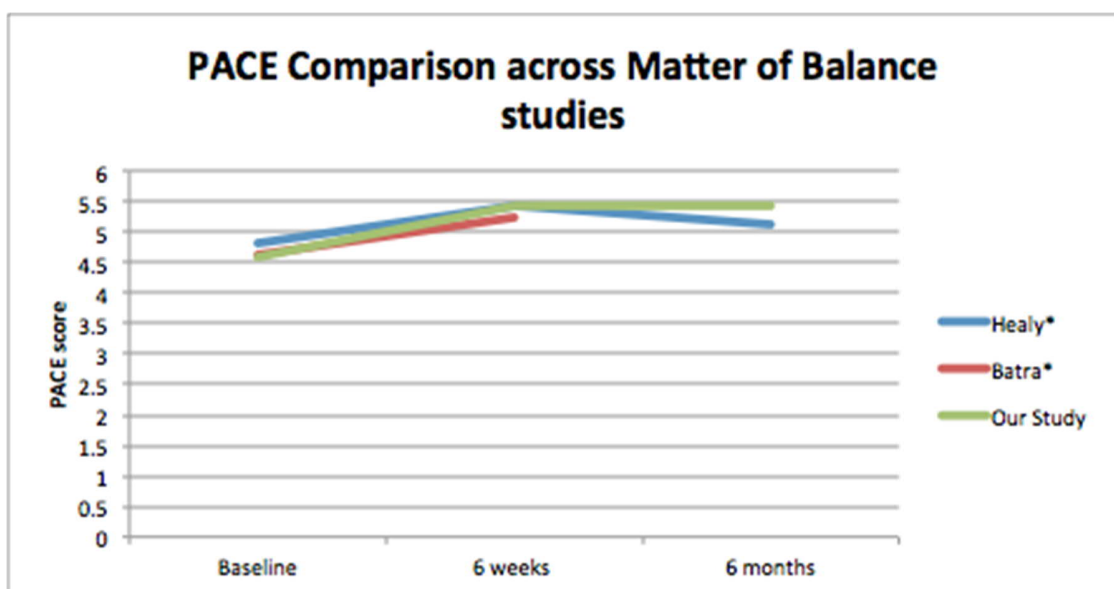


Figure 6. Modified PACE Comparison across Matter of Balance studies.



Other Significant Findings

As previously mentioned, the Healy et al⁴³ and Batra et al⁴⁶ studies demonstrated adherence as evidenced by significant improvements in the FMS and the Modified PACE at follow-up. The mean change scores for both the FMS and the Modified PACE in our study were similar to those reported by these other researchers.^{43,46} Specifically, the mean change for the PACE was 0.82 on a 6-point scale, and 0.35 on a 4-point scale for the FMS; however, these changes were not found to be statistically significant. We believe that this may be related to the smaller sample size and reduced power associated with our study. Clinically, this may support that the MOB program does increase participant's overall activity level. As previously mentioned, the participants in this study were already active at baseline; however, they still reported an increase in their activity level on the PACE at follow-up. Further research should seek to study participant adherence in populations who were not as active at baseline to learn if there would be a significant change in PACE scores among a different population. Additionally, research on less active populations may also address participant motivation at baseline and its effects on long-term adherence to program recommendations and overall increases in activity levels.

Other findings that were not found to be statistically significant in this study included changes in participants' overall health, the number of falls reported from baseline to 6-months post-program, fear of falling, and the amount of exercise participants perform each week. Though these were not statistically significant,

they do hold clinical relevance. The participants in this study were generally healthy at baseline and therefore had a low number of falls at baseline. They did not hold a large amount of self-reported fear related to falls and also exercised on average about 3 times a week at baseline. The older adults who participated in this study are assumed to have not yet entered the cycle of frailty.³ Though we are unable to determine if they would have acquired an impairment related to falling without the MOB program, the effectiveness of the program along with the maintenance of participants' health suggests the program is a beneficial prevention program. At follow-up, participants reported making changes that were in alignment with the 4 core elements of Matter of Balance.^{41,43} This overlap further supports the program's effectiveness. Similar to previous literature^{29,32}, participants from our study identified motivation, social support, perceived benefits and incorporating the exercises into their daily routine as the most influential factors facilitating level of adherence. There are limited studies at this time related to populations with decreased activity levels and more complicated impairments. Therefore further research is needed in this area in order to see if programs like MOB are supported for maintaining an individual's health, as found in this study, or if they are also supported for reversing the cycle of frailty and improving participants overall health by decreasing their number of falls and their overall fear of falling.

Limitations

This study was limited by a small sample size as we only had 27 participants. This may have decreased the study's power and, in turn, limited the number of significant quantitative findings that could be identified. The subjects were also active at baseline, which left less room for improvement in this area as compared to the general population. Lastly, the survey measures utilized for this study were self-reported so only subjective information was obtained.

Another limitation of this study was that the participants involved were likely healthier, exercised more frequently, and were more actively engaged in the community than others in their age demographic. Therefore some of the results may be different than a cohort that is more representative of this demographic. The sample size of this study was relatively small, and from communities within a fairly small geographic radius, again making it more difficult to make broad generalizations about this population throughout the country. Finally, no participants with impaired cognition were included in the study. This is an important demographic at high risk for falls in the geriatric population and warrants further study.

Future Research

Further research is needed in these areas on more diverse populations. This study's results reflect a healthy group at baseline who reported exercising 3 or more times a week. Individuals who are generally less healthy and less active

are at greater risk for falls and therefore a critical population for future studies. Additionally, this study focused on barriers and facilitators to adherence. Future research to address barriers and facilitators to registering for and adhering to a program may be an area to target with this population with decreased health and activity levels. This study's results did show a potential link between motivation and self-efficacy, and thus further research should be done to support or reject these results for other populations and similar fall prevention programs. Lastly, many of the participants reported a desire and need for a follow-up course after finishing the MOB program in order to continue with the exercises and improve overall long-term adherence. Further research is thus needed to see if a follow-up program would be cost-effective, attended, and improve overall adherence to program recommendations.

CHAPTER V: CONCLUSION

The purpose of this study was to examine self-reported outcomes associated with the MOB program with a focus on participants' perspectives of the program and attention to factors that impact adherence. After analyzing the qualitative and quantitative data, relationships emerged between awareness and falls managements as well as self-efficacy and motivation. Increased awareness may be related to improved falls management as participants reported improved awareness of their surroundings, which have improved their confidence in managing their risk for falls. There may be a link between self-efficacy and motivation and that if a participant feels confident in their abilities to manage their fall risk then they may be more likely to be motivated to adhere to recommendations. On the contrary, if a participant demonstrated decreased self-efficacy, then perhaps they had less motivation to follow recommendations. Further research is necessary to examine this relationship further. Post-program adherence to physical activity recommendations was facilitated when activities were incorporated into participants' existing routines and when participants were engaged in community exercise programs that offered social support. To further facilitate adherence, participants stated a desire for a follow-up program for continued social support and accountability. However, further research is needed to investigate the efficacy of this type of intervention and its impact on adherence

APPENDIX



A MATTER OF
BALANCE
HIGH QUALITY PROGRAMS FOR AGING

First Session Survey

METROPOLITAN
AREA AGENCY
ON
AGING

Thank you for choosing to participate in this class. We will use the information from this survey to find out how the program is helping people manage concerns about falls. All of your answers will be kept strictly confidential.

Class Site _____ Today's Date _____

Your zip code _____ Year of birth _____

Gender Female ___ Male ___ Last 4 digits of your phone number _____

Which one or more of the following would you say is your race or ethnicity?

- | | |
|--|---|
| <input type="checkbox"/> American Indian or Alaskan Native | <input type="checkbox"/> Asian or Asian American |
| <input type="checkbox"/> Black or African-American | <input type="checkbox"/> Hawaiian or Other Pacific Islander |
| <input type="checkbox"/> Hispanic or Latino/Latina | <input type="checkbox"/> White or Caucasian |
| <input type="checkbox"/> Other _____ | |

Do you live alone? ___ Yes ___ No

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?

___ A great deal ___ Quite a bit ___ Moderately ___ Slightly ___ Not at all

Tell us how much you are walking or exercising now (check only one) ✓

___ 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.

Have you ever been told by a doctor or health care professional that you have:

- | | |
|---|--|
| <input type="checkbox"/> Asthma | <input type="checkbox"/> Emphysema or COPD |
| <input type="checkbox"/> Diabetes | <input type="checkbox"/> Other lung disease |
| <input type="checkbox"/> Heart Disease | <input type="checkbox"/> Stroke |
| <input type="checkbox"/> Arthritis or other Rheumatic Disease | <input type="checkbox"/> High Blood Pressure |
| <input type="checkbox"/> Cancer | <input type="checkbox"/> Osteoporosis |
| <input type="checkbox"/> Age-related Macular Degeneration | <input type="checkbox"/> Parkinson's Disease |
| <input type="checkbox"/> Multiple Sclerosis | <input type="checkbox"/> Other _____ |

In general, would you say your health is:

- Excellent Very Good Good Fair Poor

How sure are you that: (please check ~~✓~~ the appropriate box)

| | | 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. | | | | |

A fall is when a person unintentionally comes to rest on the ground, floor, or other lower level.

How many times have you fallen in the past year? _____ times

How many times have you fallen in the past month? _____ times

What other health education, wellness or exercise classes have you taken?

- | | |
|---|--|
| <input type="checkbox"/> Arthritis Self-Management Program | <input type="checkbox"/> Arthritis Exercise Program (land) |
| <input type="checkbox"/> Arthritis Exercise Program (water) | <input type="checkbox"/> EnhanceFitness Program |
| <input type="checkbox"/> Healthy Eating for Successful Living | <input type="checkbox"/> Living Well with Chronic Conditions |
| <input type="checkbox"/> Other: | |

Thank you for completing this survey.

Matter of Balance
Pre Class ~~HealthEast~~ Survey

Name _____ Today's Date _____

Class Site _____

Gender: female _____ male _____

Last 4 digits of your phone number _____

1) In the last 12 months, have you fallen?

No _____ yes _____

2) Did any of those falls result in injury?

No _____ yes _____

3) If **yes**, circle the seriousness of the injury (Check all that apply)

- Mild/moderate (skin tear, cut, bruise)
- Serious (broken bone, head injury or hemorrhage)

4) How afraid of falling are you?

- Not at all afraid
- Somewhat afraid
- Very afraid
- Extremely afraid

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