# TriHealth Fall Prevention Study: An Analysis of the Effects of the Stepping On Fall Prevention Program when Paired with a CAPS certified Home Visit and Home Modifications

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**to the Ohio Department of Public Safety**
**Emergency Medical Services Division**

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# Introduction

The TriHealth Multifaceted Fall Prevention Study was conducted from October 2014-September 2015. This study was conducted under the review of the TriHealth Institutional Review Board. The purpose of this study was to analyze the effects of a multifaceted fall prevention study **Stepping On** when paired with a home visit with home modification installation. This was a randomized study that incorporated utilization of experimental and control groups.

Hamilton County Injury Surveillance data (2011) indicates there were 677 falls reported for individuals ages 65 and older in Green Township,OH. At the time of this proposed study, Green Township had the second highest fall rate in Hamilton County,OH. Therefore, Green Township is the targeted jurisdiction for this Fall Prevention study.

This study was based on utilization of 911 call data for falls or lift assist. At initial study period, for each patient seen by Green Township EMS for a 911 call for fall or lift assist that meets study criteria, the patient will was provided a follow up phone call after the EMS run for their fall by Green Township Fire Chief and his staff. The Green Township EMS Chief initiated a phone call based on data from EMS providers to talk with the patient and determine if they will consent to be contacted by TriHealth Fall Prevention Study Personnel for participation in this study. Then, the Green Township Fire Chief and his staff followed up with those patients who indiciated that they are patients within the TriHealth system to get their permission for TriHealth to contact them regarding their potential participation in this study. The TriHealth Fall Prevention Study team member contacted the patient to determine their interest in participating in the Fall Prevention

Study.

In addition, due to limited response from the intial recruitment method of contacting those in EMS database seen for a fall or lift assist, a protocol modification was made and approved by the TriHealth Institttuonal Review Board. This modification to the study protocol enabled researchers to obtain study participants from a second method.

The second method was to obtain a mailing list for targeted zip codes via the TriHealth Seniority program in the Green Township, OH. area to recruit self reported fallers via a targeted flyer/mailing. This method reaped a greater level of participation and enabled the study to continue.

## Study Key Definitions

Lift assist: A lift assist is generally someone that fell and is not injured, they simply cannot get up on their own, and nobody is at the residence that is able bodied to assist. On occasion, EMS may have a list assist for someone that just needs help up from a normal situation, such as help off the toilet, or help off of the chair, but that is not very common (Green Township Emergency Medical Services, 2014).

Fall: A fall is defined as an event which results in a person coming to rest inadvertently on the ground or floor or other lower level (World Health Organization, 2015).

## Hypotheses

Implementation of the TriHealth Multifaceted Fall prevention study will benefit the “at risk” senior population by doing the following:

- Reduce the incidence of 911 calls due to falls or lift assist* (obtained from EMS data)
- Reduce the incidence of self reported falls
- Less transport by EMS to hospital for Falls
- Reducing the incidence of Emergency Room visits due to falls
- Reducing the incidence of overnight hospitalizations due to Falls
- Demonstrated improvement in self awareness measures related to falls as evidenced by the Falls Behavioral Scale
- Elimination and reduction of high risk fall areas in the home
- Improving balance measures (experimental group only) as quantified on the Timed Up and Go Test and the 30 second chair stand test

## Study Design

The study is randomized control study with an intervention group and a control group.

### Sample Size Determination:

A sample size calculation conducted by our Program Evaluator indicated that a sample of 200 participants in each group would yield the most statistically significant data.

However, due to funding limitations, health issues for participants and other limitations placed on study, we are only able to conduct the study on 37 individuals in the Intervention Group and 27 individuals in the Control Group.

## How Study Participants Were Obtained:

Study participants were obtained through two means. The first method involved study participants recruited via a review of the 911 database in Green Township, OH to determine individuals age 60 and older that had called 911 for a fall. The second method for recruiting study participants was found to be necessary due to limited reponse from phone calls that the Green Township Emergency Medical Services Chief made to those who had called 911 for a fall or lift assist. A modification to the study protocol was made and approved by the TriHealth Institutional Review Board to obtain study participants from a second method. The second method was to obtain a mailing list for targeted zip codes via the TriHealth Seniority program in the Green Township Ohio area to recruit self reported fallers via a targeted flyer/mailing. Details for both methods are noted below.

### *Method 1:*

Once the EMS receives a call for a Fall for a senior age 60 and older in Green Township Ohio here are the steps to determining study participants:

- Tom Dietz Fire Chief, Green Township, Ohio Fire and EMS within his scope of practice provided a follow up phone call for every senior age 60 and older seen by Green Township EMS for a Fall or Lift assist that was NOT transported to an

area hospital.

- Here is the script for recruitment for Green Township Fire Chief:

  Good Morning/ Afternoon,

  My name is _____. I understand that Green Township, OH. EMS took care of you this week as a result of a 911 call for a fall.I have a couple of questions for you today. Would you mind answering these?

  1. Have you been treated at a TriHealth facility within the past year? That would be Good Samaritan Hospital, Good Samaritan Western Ridge, or Glenway Medical Center or seeing a TriHealth Physician.
  2. If yes, then proceed to number 3
  3. Since you have answered yes to these questions would it be ok for a member of the TriHealth Fall Prevention Study to contact you to see if you would like to participate in their study?
  4. If yes, then, “In order for me to forward your information to the TriHealth Fall Prevention Study Team would you be okay if I stopped by your home to get you to sign a form that states that we have your permission to forward your information to the TriHealth Fall Prevention professional who will follow up with you to discuss enrolling you in the study

  Thank you so much for your time. Have a great day!

For this first group recruited via 911 database, a member of the research team contacted the potential study participant after receiving the initial contact sheet with

potential patient signature from Green Township EMS. At the time of this call a home visit was scheduled for the researcher to meet with the patient, review study criteria and determine if the patient was indeed eligible for the study. If so, the patient completed the Informed Consent process and the initial dataset was obtained for the study.

*Method 2:*

A flyer was distributed to TriHealth Seniority program members within targeted zip codes. The targeted mailing/flyer included the following content:

- **Has Falling Scared You? There is help.**
- **To qualify, answer these questions …**
    - **Have you fallen in the past 20 months?** *(Fallen between XXXX and XXXX)*
    - **Are you a Green Township resident age 60 or older?**
    - **Are you a TriHealth patient?** *(Ever receive treatment at Good Samaritan Hospital or Good Samaritan Western Ridge or have a TriHealth doctor)*
- **If you answered yes to the above questions, please contact us at XXXX.**
    - Leave your contact information for the TriHealth Fall Prevention Study.
    - You will receive a return phone call within 24 hours.
- **Deadline for enrollment is XXXX. Please call to participate if you have answered yes!**

Once these individuals contacted the falls study phone number they received a return phone call within 24 hours. At the time of the return call a home visit was scheduled for

the researcher to meet with the patient, review study criteria and determine if the patient was indeed eligible for the study. If so, the patient completed the Informed Consent process and the initial dataset was obtained for the study.

## Inclusion Criteria:

- Seniors age 60 and up who have called 911 for a fall or lift assist in Green Township, OH. who were provided EMS Services due to fall or lift assist
- Must a be a TriHealth patient with a TriHealth Physician or having gone to either GSWR or GSH (so then they are covered as Human Subjects by TriHealth Institutional Review Board)

## Exclusion Criteria:

- Those under 60 who contact 911 for Fall or lift assist
- EMS calls other than falls or lift assist
- EMS patients who are NOT a patient of TriHealth (Good Samaritan Hospital, Good Samaritan Western Ridge, or Glenway Medical Center or seeing a TriHealth Physician) (as they would not be covered by the TriHealth IRB)
- Patients who are actually transferred to a medical facility
- Once it is determined that the patient is a TriHealth patient and informed consent is received from the patient, they are randomly enrolled into one of the two study groups.

## Randomization of Study Groups:

To ensure randomization of study groups, each participants study group was chosen based on computerized ramndomization software.

*Intervention Group:*

Once randomly placed in the intervention group the patient will go through the following process:

- Attend Session 1 of the Stepping On Program
    - Content:
        - Introduction, Overview, and Choosing What to Cover
        - Get to know each other
        - Sharing of fall experiences and choose what additional topics to cover in the course of the program
        - Guest physical therapist introduces the balance and strength exercises
    - Paperwork - Participant will:
        - Complete the Pre-Test for Program
        - Complete the Program Registration forms
        - Complete balance assessment with qualified Medical Professional (PT, OT, M.D.) prior to commencing the Stepping On Program
        - Complete Falls Behavioral Scale pre-test
- Attend Session 2 of the Stepping On Program

- Content:
    - Exercises and Moving about Safely Review
    - Practice exercises with guest physical therapist
    - Explore the barriers and benefits of exercise
    - Moving about safely – chairs and steps
    - Learning not to panic after a fall

- Attend Session 3 of the Stepping On Program
    - Content:
        - Advancing exercises
        - Home Hazards Review and practice exercises
        - Discuss when and how to advance exercises
        - Identify hazards in and about the home and problem-solving solutions
- Attend Session 4 of the Stepping On Program
    - Content:
        - The guest vision expert discusses the influence of vision on risk of falling
        - The guest community safety expert talks about strategies to get around the local community and reduce the risk of falling
        - Learn about the features of safe shoes and identify clothing hazards.
- Attend Session 5 of the Stepping On Program
    - Content:

        - The importance of Vitamin D, sunlight, and calcium to protect from fall related injury
        - The guest pharmacy expert talks about medications that increase falls risk
        - Strategies to sleep better are discussed.

- Attend Session 6 of the Stepping On Program
    - Content:
        - Give participants the opportunity to see and try hip protectors
        - Explore different weather conditions that could lead to a fall
        - Review exercises with the guest physical therapist,
        - Practice safe mobility techniques learned during the program in a nearby outdoor location
- Attend Session 7 of the Stepping On Program
    - Content:
        - Review and practice exercises
        - Review personal accomplishments from the past seven weeks
        - Reflect on the scope of things learned
        - Review anything requested
        - Finish any segment not adequately completed
        - Time for farewells and closure
    - Paperwork - Participant will:
        - Complete the Post-Test for Program
        - Complete balance assessment with qualified Medical Professional

(PT, OT, M.D.) prior to commencing the Stepping On Program

- Complete the Falls Behavioural Scale post-test

- Home Visit or Call: The leader will complete a home visit within a few weeks after Session 7 to support follow-through of preventive strategies and assist with home modifications. This visit will be done by a Certified Aging in Place (CAPS) Certified Specialist in collaboration with an Occupational Therapist.

*Control Group:*

Once enrolled with informed consent the patients will:

- Be provided with Fall Prevention brochure
- Complete Stepping On pretest
- Complete Falls Behavioral Scale pre-test
- Be provided with brochure regarding TriHealth referral sources and community resources for fall prevention (PWC, etc.) with no actual intervention
- Complete Stepping On program post test after intervention group completes class
- Complete Falls Behavioral Scale post-test after intervention group completes class

Note that there will be no balance assessments conducted on the control group as it was deemed to have a possible placebo effect. In addition, it was deemed that it could be considered unethical to do balance tests knowing that the researcher cannot provide assistance in terms of program or resources if the participant has a balance issue.

EMS RUN data and 911 data related to falls will be obtained and tracked for both groups over the course of 6 months from informed consent to 3 month follow up time period. Baseline data on utilization of the 911 and EMS system will be obtained and compared, analyzed in relation to the follow up data at the 3 month mark from program inception to determine impact on EMS runs.

## Home Visit and Home Modifications:

A Certified Aging in Place Specialist (CAPS) and Occupational Therapist conducted the home visit follow up and the subsequent home modifications were installed and completed by the Certified Aging in Place Specialist team using the following process:

- Upon completion of the Stepping On classes, an appointment was scheduled for the Certified Aging in Place Specialist and Occupational Therapist to conduct home visit assessment
- CAPS certified professional followed checklist and made notes as to barriers within the home and what is recommended
- CAPS specialist obtained signatures from patient to have grab bars and necessary modifications put into place within the home
- Home modifications (i.e. grab bars, specialized safety light) were installed by the CAPS certified professional for experimental group participants
- Documentation of Home modification was completed and signed by patient with appropriate boxes checked as to what was installed or fixed

- A CAPS certified evaluator is trained to meet the needs of the older adult for Aging in Place by modifying homes so someone can live there longer and more safely as they age. This is done by addressing the most common barriers in a home. In addition, once these barriers are identified we are taking it one step further where the literature demonstrates room for research opportunity. Not only was a home visit assessment by a CAPS specialist as well as an Occupational Therapist conducted for each participant in the intervention group. In addition, the appropriate home modifications were installed for those in the intervention group.

## Security of Participant Data:

All study data will be kept in a locked box in the office of Stephanie Lambers M.Ed., OTR/L and Krista Jones, B.S. at Bethesda North Hospital Trauma Services.

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# Executive Summary

In 2012 fall related injuries cost the state of Ohio $1.8 million dollars every day. (Ohio Injury Prevention Partnership, 2012) According to the Hamilton County General Health Department's statistics (2011) one out of three persons aged 65 and older falls annually and at least 40 percent of these falls result in injury. Falls are the leading cause of hospitalizations, emergency room visits and deaths in individuals over age 65. There were 4,695 TriHealth emergency room visits in 2014 related to falls. In 2014 Green Township had 2973 EMS Runs for patients 60 or over. Of the 2973 EMS Runs for patients 60 and over, there were 284 falls with at least a suspected injury and 371 lift assists.

In addition to the emotional and personal costs related to falls, there are significant health care costs. TriHealth 2014 statistics indicate the average direct cost of one fall related hospital admission to be approximately $10,694 and those admitted to extended care facilities can anticipate monthly costs of $3,000 - $5,000 and those rates are increasing annually.

Stepping On is a CDC approved and evidenced based fall prevention model that includes fall prevention education, home modifications and follow-up home visits. The program was developed by Dr. Lindy Clemson, PhD. and Megan Swann OT in Australia and has been successfully replicated at the University of Wisconsin Medical Center by Dr. Jane Mahoney. The Stepping On Program reduced falls in Australia by 31% and had similar results when replicated at the University of Wisconsin.

People Working Cooperatively Certified Aging in Place Specialists (CAPS) and Occupational Therapy Home evaluation with implementation of safety modifications are an additional Evidence based /value added component of this project. Program sustainability for this fall prevention research is temporarily ensured by obtaining local funding of ongoing costs while further implementing the Stepping On Program. In addition, the additional component of individualized Home modifications, as well as a risk identification and referral system for fall prevention will be further continued as a follow up to this study until the program is subsidized entirely by fees for service. A cost-benefit analysis reported in the Journal of Safety Research (2015) concluded that the return on investment for Stepping On participants over age 65 was 64 percent for each dollar invested and the net benefit $134.37 per participant.

This study provides support that the Stepping On program is effective at reducing fall risk and falls in older adults. The self-reported number of falls in the intervention group was significantly lower at follow-up, whereas the decrease in the control group was not. Likewise, there were statistically significant improvements in the intervention group, but not the control group, in several of the dimensions of the Falls Behavioral Scale: Cognitive Adaptations, Protective Mobility, Avoidance, and Practical Strategies. Improvement in these scales indicates that particpants are practicing behaviors that are associated with a reduced risk of falls. The Stepping On program focuses a lot on exercise and improving balance. The Timed Up and Go Test and the 30-Second Chair Stand Test demonstrated significant improvements in mobility and balance in the program participants. Another important issue illustrated in this study are the number of home modifications that need to be made to reduce the risk of falls in older adults. In

this study, many of the participants needed safety features added to their home, but had not previously done so. The fact that these modifications were provided at no cost to them and that there some was someone to provide the installation was key. Many older adults on a fixed income cannot afford safety equipment and do not have someone to do the installation for them or the money to pay someone to do the installation.

The limited number of participants and the limited amount of time for this study did limit the conclusions that can be drawn in regard to a reduction in 911 calls, ER visits, and hospitalizations due to falls. However, the research referenced in our literature review has shown that those with better balance and mobility, who are more aware of techniques for preventing falls, and who create a home environment that reduces the risk of falls are less likely to experience falls. This study did demonstrate a reduction in self-reported falls, increased behaviors associated with fall risk reduction, and improved balance and mobility. These factors coupled with the numerous home improvements made will hopefully lead to a reduction in falls over the upcoming years.

# Information/Qualifications

**Principal Investigator** Laura Trice M.D. FACP,AGSF, CMD,WCC A Leader in Developing Geriatric Care Models. Management skills include Medicare Advantage, PACE (Program of All-Inclusive Care for Elderly) and long-term care medical direction. Clinical skills include primary care, long-term care, wound care, hospice and palliative care.

**Program Evaluator** Amy Bernard, PhD, MCHES is an Associate Professor in the Health Promotion and Education Program at the University of Cincinnati and has served as an evaluation consultant for numerous health promotion and education programs for over 20 years.

**Lead Researcher** Stephanie Lambers M.Ed. OTR/L Occupational Therapist and Community Health Educator with 26 years of experience in adult rehabilitation and prevention of traumatic injuries.

**Researcher** Krista Jones B.S. Community Health Educator with 18 years of experience in Community Health Promotion as well as Injury Prevention.

**Consenter and follow up** Sharon Garry BA in Education

**Consenter and follow up, extensive data entry** Paris Willis M.S.

**Consenter** Ashley Martin MHA

# Review of Literature

Stepping On is a CDC approved and evidenced based fall prevention model that includes fall prevention education, home modifications and follow-up home visits/phone calls. The Stepping On Program reduced falls in Australia by 31% (Clemson et.al. 2004). The program was developed by Dr. Lindy Clemson, PhD. and Megan Swann OT in Australia and has been successfully replicated at the University of Wisconsin Medical Center by Dr. Jane Mahoney (Guse, et al. 2015). A cost-benefit analysis concluded that

the return on investment for Stepping On participants over age 65 was 64 percent for each dollar invested and the net benefit $134.37 per participant (Carande-Kulis, Stevens, Florence, Beattie & Arias, 2015).

In the Lead researcher discussing program Stepping On results with the research team at the University of Wisconsin, Department of Geriatric Medicine, an important piece of feedback was noted from their program participants, despite their strong research results. Participants indicated that even with all that they learned throughout the program, where they still had challenges was in knowing who in the community to contact to actually do proper installation of Home modification recommendations. This is where our research study advances a step further in meeting the needs of the older adult with falls.

According to Chase, Mann, Wasek and Arbesman (2012) thirty-three journal articles related to fall prevention and home modification were identified, analyzed and consolidated. The strongest fall prevention program results were noted for multifactorial programs that included home evaluations and home modifications, physical activity or exercise, education, vision and medication checks, or assistive technology to prevent falls. Positive outcomes included a decreased rate of functional decline, a decrease in fear of falling, and an increase in physical factors such as balance and strength. The strength of the evidence for physical activity and home modification programs provided individually was moderate.

The research indicates strong support for professionals to do home visit evaluations for fall reduction (Luck, et. al 2013). However, the literature also indicates that where

multifaceted programs are limited are in the need for referrals and recommendations upon program completion (Lee et. al 2013).

According to Simpson, Bendall, Tiedemann, Lord and Close (2014), for older adults who have fallen, ambulance services appear to provide timely responses to older people who have fallen, and "long-lies" are relatively uncommon. More than one-quarter of patients seen for a fall were not transported to an emergency department, and repeat use of ambulance resources appears to be common. Opportunities exist to explore alternate care pathways and models that maximize outcomes for non-transport patients as well as improving efficient use of ambulance services.

# Historical Perspectives

Falls in the elderly are a major source of injury resulting in disability and hospitalization. They have a significant impact on individual basis in areas such as loss of quality of life, nursing home admissions, as well as a societal basis (in areas such as healthcare costs. Even though falls in the elderly are common there are some clearly identified risk factors (Pfortmueller, Lindner and Exadaktylos 2014). Furthermore, home hazard reduction strategies are more effective when combined with other fall prevention approaches such as exercise programs. In conclusion elderly patients should routinely be screened for fall related risk factors and be provided an individually tailored fall prevention program to meet their needs.

According to Greenwood-Hickman, Rosenberg, Phelan & Fitzpatrick 2015 the literature indicates that community based exercise programs can reduce the risk of medical falls. In addition, when compared with control communities, communities provided with funding to implement the Stepping On Program, along with communities provided funding for Stepping On paired with community support for fall prevention demonstrated a higher reduction in fall related injuries in comparison to a control group only provided community resources (Guse et. al 2015).

A Literature review on fall prevention for the older adult suggests extensive support for multidisciplinary programs for fall prevention (Chase, Mann, Wasek and Arbesman 2012), as well as home visits for home modification recommendations by Occupational Therapists and other professionals. Most research involving home visits involves an Occupational Therapist or other professional making recommendations for safety in the home with very little research indicating the actual modifications that were made in homes post home visit recommendations. Little research has been done on incorporating the expertise of a Certified Aging in Place Specialist in combination with an Occupational Therapist for evaluation, as well as actual installation of home modifications. In addition, very little information exists in the literature for addressing an aimed reduction of 911 calls for falls or lift assist by partnering with a multifactorial, Evidence Based fall prevention program with installation of home modifications.

Where the difference between those articles and this study lies is in the combination of the Evidence Based Stepping On Program, not only a home visit by an Occupational Therapist, but also a Certified Aging in Place Specialist and thirdly in actual installation and completion of Home modifications upon program completion.

# Current Status of Falls in Older Adults

The Centers for Disease Control indicates that Falls often cause severe disability among survivors. In addition, injuries from falls lead to: fear of falling, sedentary behavior, impaired function and lower quality of life. Annually 1 out of 3 older adults fall (Yoshida, WHO).

Falls are an escalating problem throughout the state and will only grow in magnitude as the aging population grows. According to the Ohio Department of Health Burden of Injury from Unintentional Falls in Ohio, falls among Ohioans 65 years and older accounted for $4.2 billion, more than two-thirds (68 percent), of the total annual cost of nonfatal, hospital-admitted falls. "Beyond the personal and family impact, fatal and nonfatal falls cost Ohio and its residents an estimated $646 million each year in direct medical and work loss costs, or $1.8 million each day."

The State of Ohio spent $365 Million in 2013 on fall related medical treatment for falls. This ever increasing number of falls is also causing enormous pressure on EMS department budgets and resources and physical demands on EMS personnel with repeated calls for falls or lift assistance burdening the system.

Data from the Hamilton County Injury Surveillance System (2011) indicated that there were 6,413 fall reported by adults ages 65 and older. Aside from the City of Cincinnati, the highest incidence of falls noted for ages 65 and older was in Green Township, Ohio with 677 falls noted (Hamilton County Injury Surveillance System, 2011).

In Green Township, Ohio (2013) there were 866 seniors aged 65 and older who called

911 due to a fall. Of the 866, 510 were transported due to a fall and 356 were seen by Green Township, Ohio EMS due to fall related causation or lift assist with no transport. This number of residents seen for fall related causation and lift assist provides an excellent population to address an Emergency Medical Services response initiated Fall Prevention study for seniors in Green Township, Ohio. The impact on the EMS system for the frequent fallers is significant in the resources involved, as well as the actual physical demands placed on EMS personnel with responding to multiple lift assist situations.

The State of Ohio has implemented the STEADY U Ohio Initiative, as well as more widespread training and dissemination of the Matter of Balance Program, with little emphasis to this time on the Stepping On Evidence Based Fall Prevention program. A nearby partner in the Midwest Injury Prevention Alliance has addressed fall prevention head on with their investment in training and implementation of the Stepping On Evidence Based Fall Prevention Program across the State of Wisconsin.

Wisconsin is the national hub of training for the Stepping On Evidence Based Fall Prevention Program. The program facilitators of Stepping On in this research study received their training in Wisconsin in September 2014 (through generous funding from Bethesda Foundation, Cincinnati, Ohio).

# Future Trends Both Regionally and Nationally

With the growing aging population and Medicare Readmission rulings tightening, as well as a focus on preventive health measures, the emphasis on Evidence Based Fall Prevention measures across our health care systems in Ohio and the United States is more important than ever. Fast paced changes in health care charge those who work in health care, as well as community health to find innovative means to address fall prevention and ultimately reduce the burden of health care costs for our society.

# Education and Training Issues & Considerations

There is a need for extensive training across Ohio for Stepping On. With only 2 trained professional facilitators in Cincinnati, as well as 2 trained facilitators in Columbus, Ohio there is an identified need to expand widespread training in the Stepping On Program.

# Legislative/Regulatory Issues & Considerations

Some additional considerations at the state level are to explore passage of legislation that would provide tax incentives for seniors to have basic home modifications as a means of cost savings in health care.

In addition, representatives at the state level in Ohio should explore working with Health Care insurers across Ohio to provide Insurance coverage for more Evidence Based fall prevention. This could be in the form of the Stepping On Program implementation as

well as home modifications based on the Whole Home concept. This would be a value add for seniors similar to the insurance coverage support seen for community based exercise programs such as Silver Sneakers.

# Data and information issues and considerations

Some of the original study participants were lost for two reasons:

- 13 were excluded from the analysis due to IRB requirements
- 6 dropped out of the study due to health or personal issues

# Analysis of the Findings

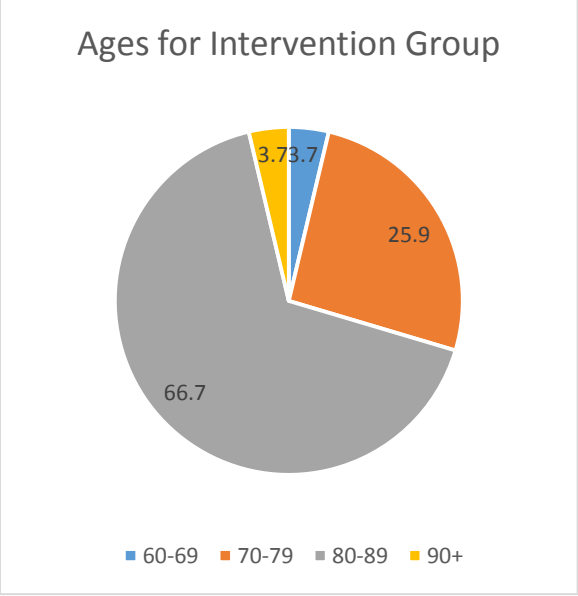
Note that for all data analysis the number of participants in the intervention group was 37 and the number in the control group was 27.

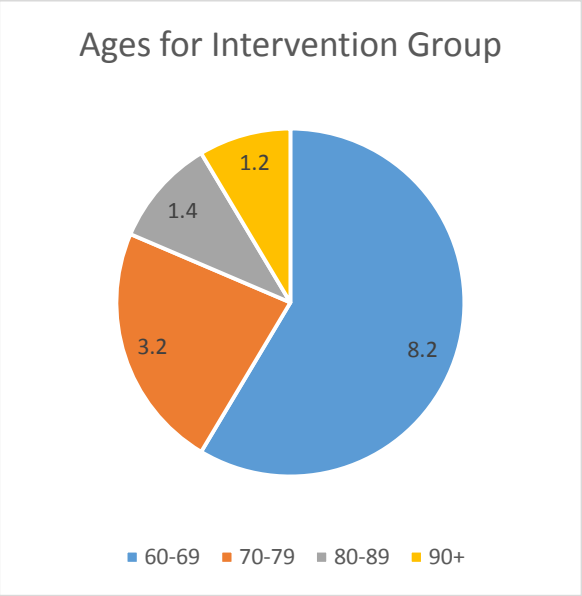
## Demographics

### Age:

The intervention group participants ranged in age from 63 to 90 with a mean age of 76.78 (SD=7.38). For the control group, ages ranged from 68 to 90 with a mean age of 81.52 (SD=5.06). Figure 1 illustrates the percentages in various age groups for both the intervention and control groups.

Figure 1 – Age Ranges

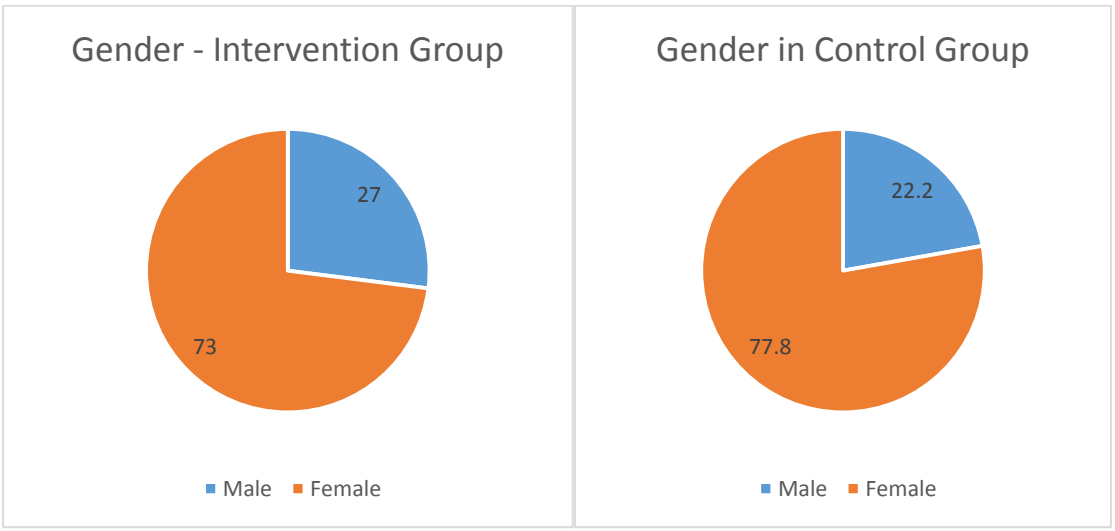


## Gender:

As illustrated in Figure 2, in the intervention group, 27% of the participants were male and 73% were female. In the control group, 22.2% were male and 77.8% were female.

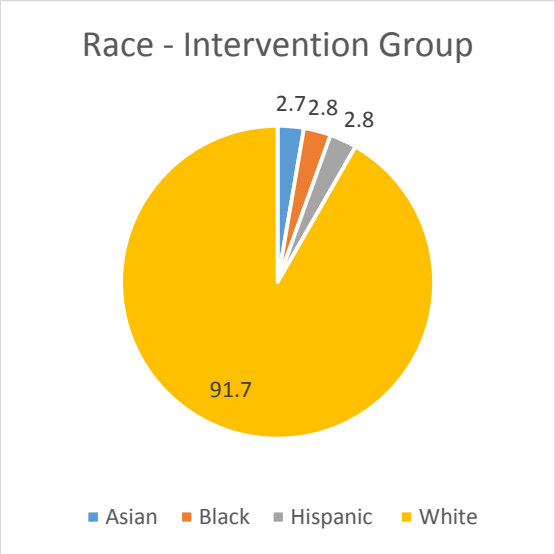
Figure 2 – Gender

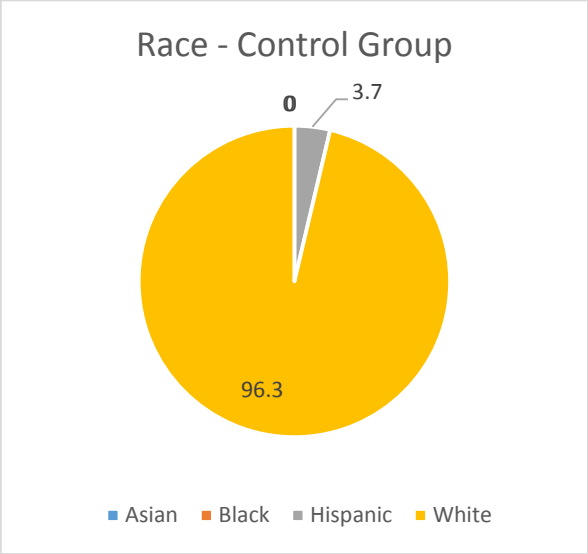


## Race/Ethnicity:

As described in Figure 3, both the intervention and control groups were primarily comprised of white participants (91.7% and 96.3%, respectively). The intervention group also included black participants (2.8%), Hispanic participants (2.8%), and Asian participants. There were no Asian or Hispanic participants in the control group and 3.7% were black.

Figure 3 – Race

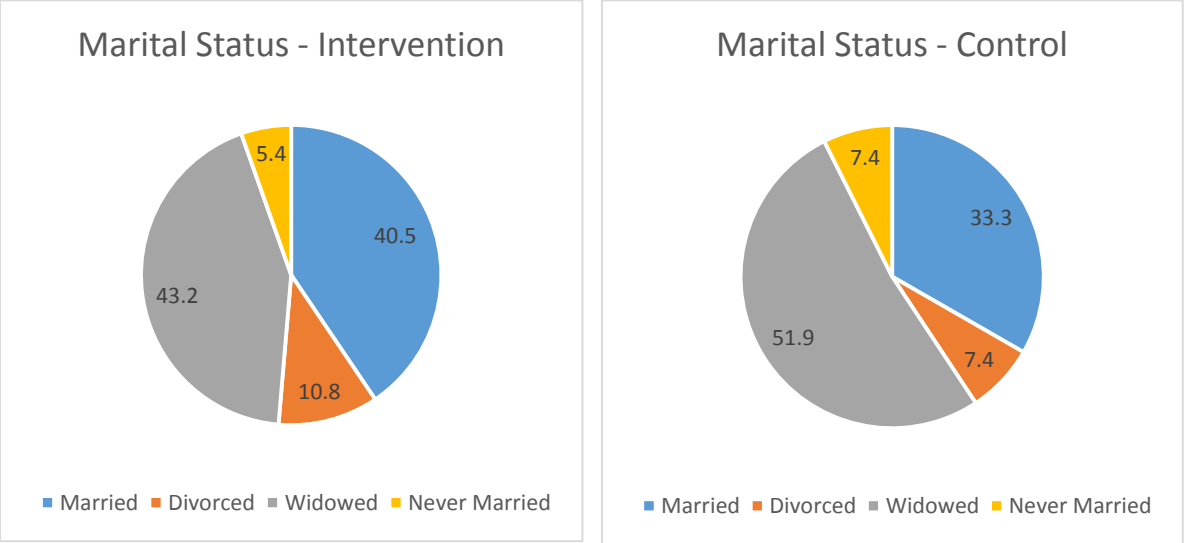


## Marital Status:

Figure 4 illustrates that in both the intervention and control groups, the majority of participants were either married (40.5% and 33.3%, respectively) or widowed (43.2% and 51.9%, respectively). Divorced participants made up 10.8% of the intervention group and 7.4% of the control group. Approximately 5.4% of the intervention group was never married, and 7.4% of the control group was never married.

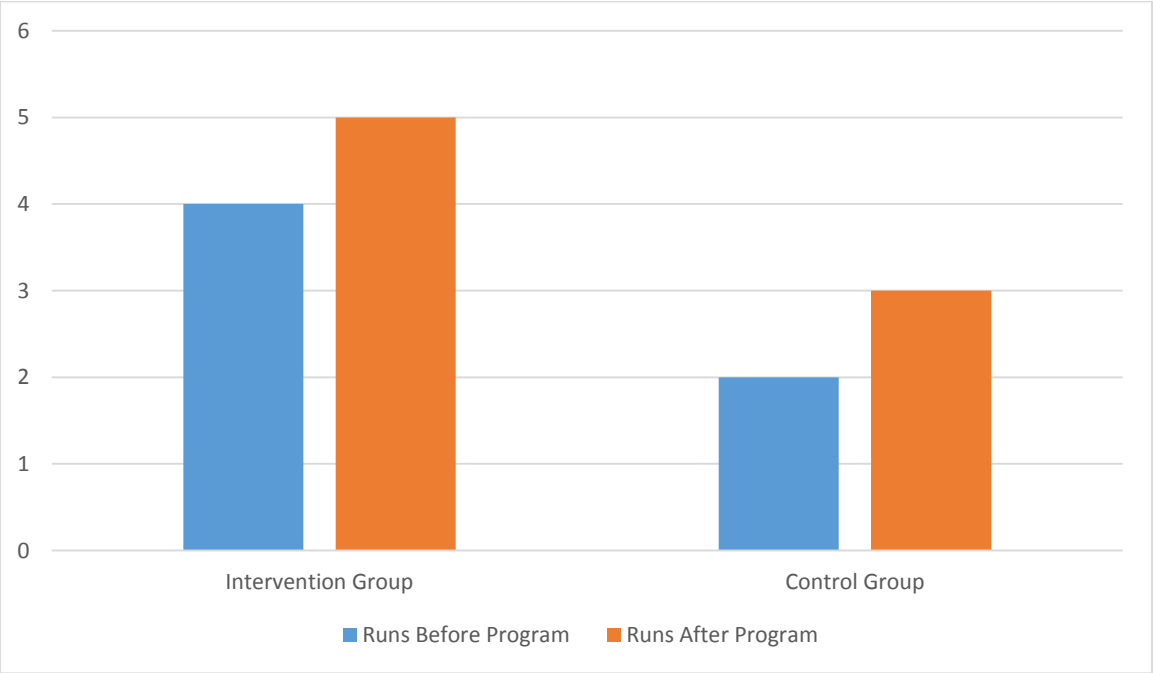
Figure 4 – Marital Status



## Reduction in 911 Calls Due to Falls or Lift Assist

With a small sample of individuals for this study, there is not a great deal of data to report in regard to 911 calls due to falls or lift assists. This is further complicated by the fact that a majority of calls made for the intervention group were for the same individual. As illustrated in Figure 5, there were a total of 4 calls from May of 2013 to the initiation of the study for those in the intervention group, 3 from the same individual. Following the program, there were 5 calls, with 4 from the same individual. For the control group, there were 2 runs prior to the initiation of the study and 3 following the study. Neither of these figures include individuals with multiple 911 calls.

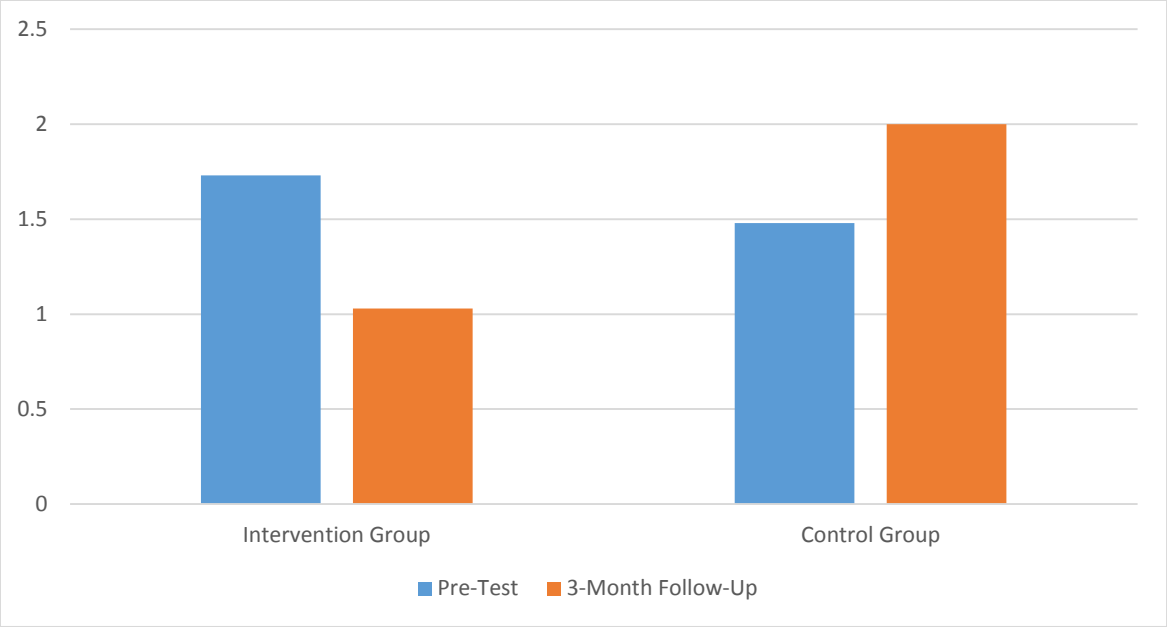
Figure 5 – EMS Runs



## Reduction in the Incidence of Self-Reported Falls

Participants completed a survey prior to beginning the Stepping On class, immediately after the Stepping On class, and 3 months after completing the class. On this survey, they were asked “How many times have you fallen in the past 6 months?” Because the question asked about the last 6 months and the time of the pre- and immediate post-test overlapped, only the pre-test number and the 3-month follow-up numbers are described here. Figure 6 shows the number of self-reported falls for both the intervention and control groups at pre-test and at the 3-month follow-up. For the intervention group (n=37), the number of falls at pre-test ranged from 0-10 and the mean number of falls was 2.17 (SD=0.36). At the follow-up it was 1.24 (SD=.20). This was a statistically significant reduction in falls for program participants ($t_{(df=36)}$=2.170, p=.037). In the control group (n=27), the number of falls ranged from 0-12 and the mean number of falls at pre-test was 1.48 (SD=2.50). At the follow-up it was 2.00 (SD=4.14). This was an increase in the number of falls, but not a statistically significant one ($t_{(df=26)}$=0.553, p=.585).

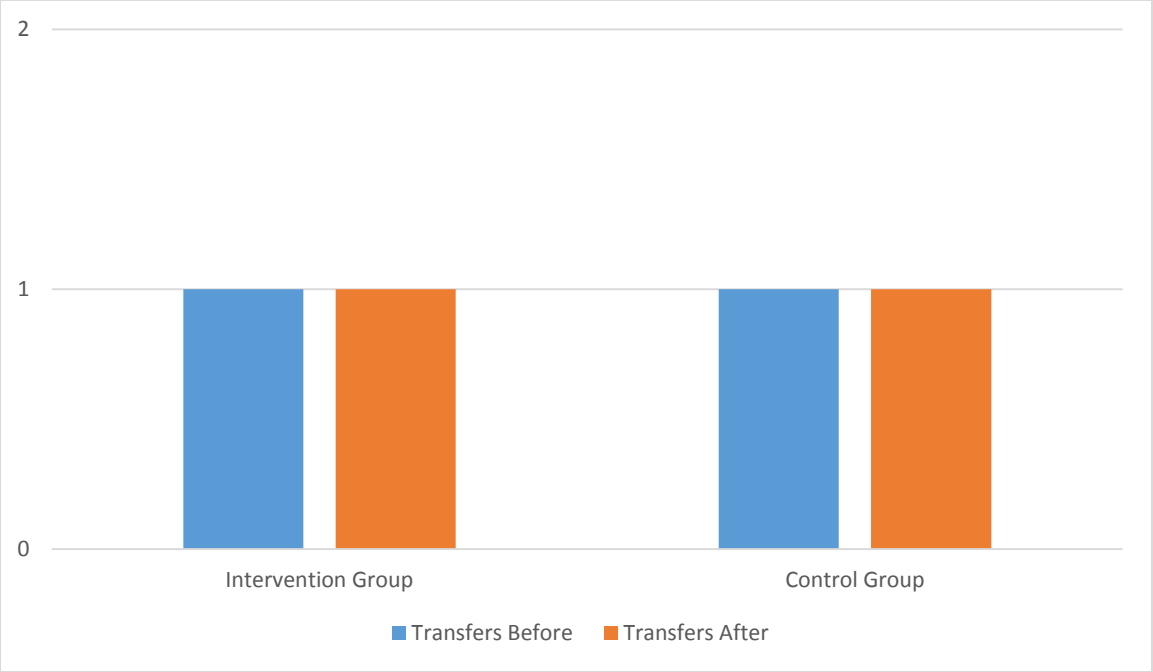
Figure 6 – Self-Reported Falls



## Reduction in Transport by EMS to Hospital for Falls

As with the EMS run data, with a small sample of individuals for this study, there is not a great deal of data to report in regard to hospital transfers. As Figure 7 illustrates, for both the intervention and control groups there was 1 911-call that required a transport to the hospital before the program as well as 1 after the program.

Figure 7 – Transport by EMS to Hospital

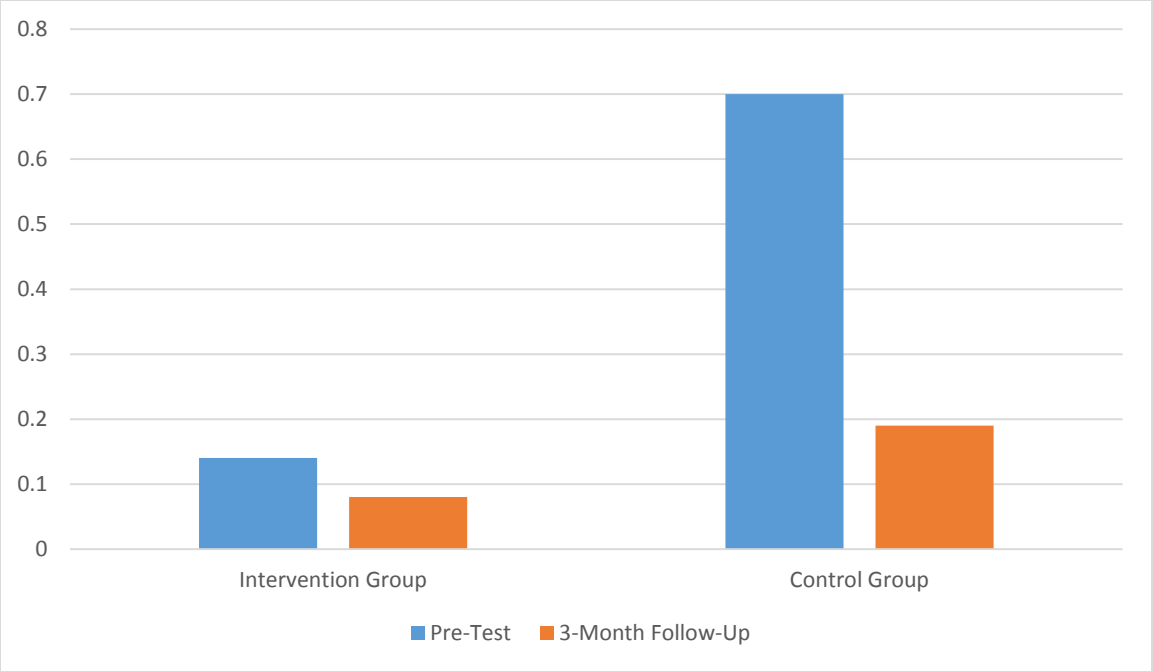


## Reduction in Emergency Room Visits Due to Falls

On the survey participants completed for the program, they were asked “In the past 6 months, how many different times did you go to a hospital emergency department because of injuries due to a fall?” Because the question asked about the last 6 months and the time of the pre- and immediate post-test overlapped, only the pre-test number and the 3-month follow-up numbers are illustrated here.

As described in Figure 8, for the intervention group (n=37), the pre-test shows that the number of emergency room visits ranged from 0-2 and the mean was 0.14 (SD=0.42). At the post-test the number ranged from 0-1 and the mean was 0.08 (SD=0.28). This reduction was not statistically significant however ($t_{(df=36)}$.0702, p=.487). For the control group (n=27), the number of ER visits at pre-test ranged from 0-10 and the mean was 0.70 (SD=2.03). At the follow-up the number ranged from 0-3 and the mean was 0.19 (SD=0.62). This reduction was not statistically significant ($t_{(df26)}$=1.79, p=.085).

Figure 8 – Self-Reported Emergency Room Visits

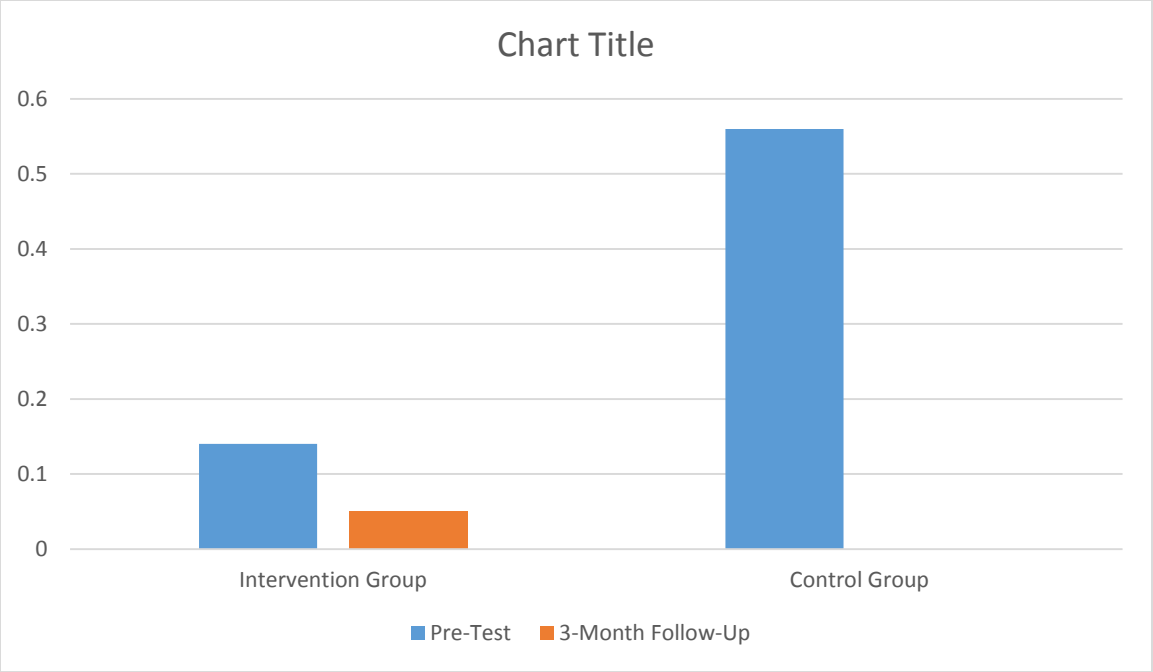


## Reduction in Overnight Hospitalizations Due to Falls

On the survey participants completed for the program, they were asked “In the past 6 months, how many different times did you stay in a hospital overnight or longer because of injuries due to a fall?” Because the question asked about the last 6 months and the time of the pre- and immediate post-test overlapped, only the pre-test number and the 3-month follow-up numbers are illustrated here.

As figure 9 points out, at the pre-test for the intervention group, the self-reported number of times an overnight hospital stay occurred due to a fall ranged from 0-2 and the mean was 0.14 (SD=0.42). At the 3-month follow-up, the number ranged from 0-1 and the mean was 0.05 (SD=0.23). This reduction of was not statistically significant ($t_{(df=36)}$=1.138, p=0.262). For the control group, the pre-test number of hospital stays ranged from 0-10 and the mean was 0.56 (SD=1.99). At the follow-up there were no reports of overnight hospital stays due to a fall. This reduction was not statistically significant ($t_{(df=26)}$=1.453, p=0.158).

Figure 9 – Overnight Hospital Stays



## Improvement in Self-Awareness Related to Falls

Participants completed the Falls Behavioral Scale for the Older Person (FaB) prior to the Stepping On program, immediately after completing the program, and 3-months following completion of the program. This survey is designed to identify the older person's awareness and practice of behaviors that could potentially protect against falling. There are a total of 30 questions on the scale and these break down into ten Behavioral Dimensions. For the purposes of this study, 24 questions were used which addressed nine of the Behavioral Dimensions. For each question, the respondent is asked to answer in regard to frequency of the behavior: never, sometimes, often, and always. The scores for each response are 1, 2, 3, and 4 respectively, so that a higher score indicates a higher frequency of performing the behavior and thus a more positive behavior in regard to fall prevention. Some questions require reverse-coding of the scale due to the wording of the question (e.g. a lower score would indicate a positive behavior in regard to fall prevention). Questions that are reverse coded are indicated in the descriptions of each of the dimensions. The results of this scale are broken down by dimensions as follows.

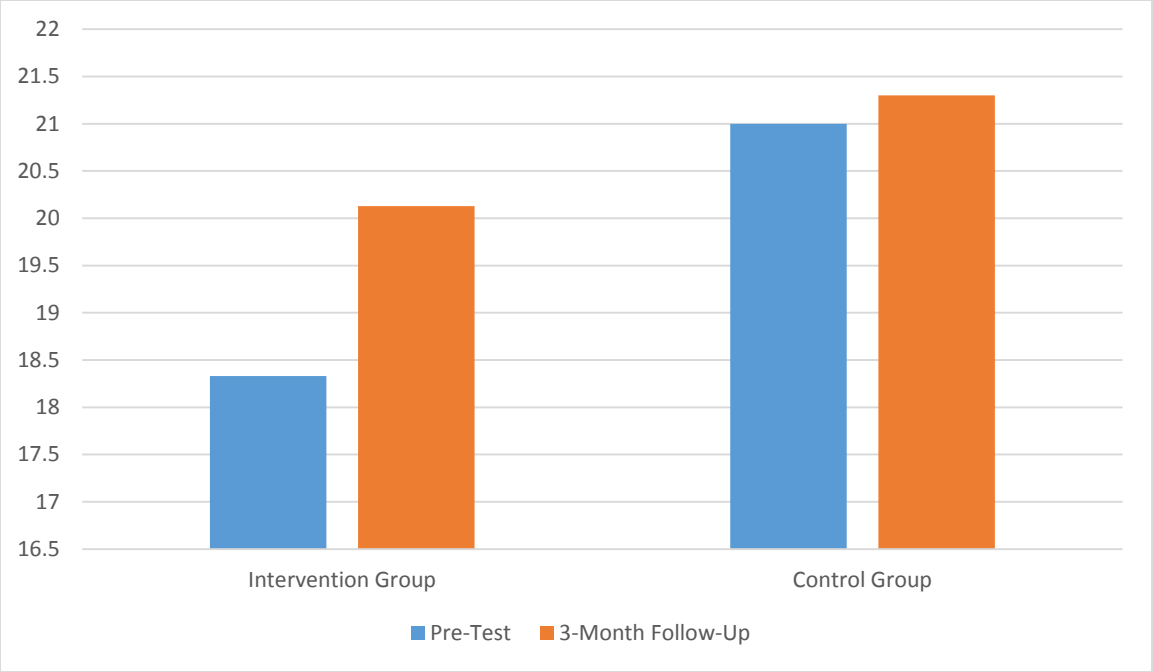
## FaB - Cognitive Adaptations Dimension:

The first behavioral dimension is Cognitive Adaptations and this dimension describes behaviors associated with thinking and planning. It is made up of 6 questions:

1. When I am feeling unwell, I take particular care doing everyday things.
2. When I am feeling ill, I take special care of how I get up from a chair and move around.
3. When I walk outdoors, I look ahead for potential hazards.
4. When I go outdoors, I think about how to move around carefully.
5. I cross at traffic lights or pedestrian crossings whenever possible.
6. I hold onto a handrail when I climb stairs.

For the Cognitive Adaptations scale, possible scores ranged from 6-24. As figure 10 shows, for the intervention group (n=24) the mean score was 18.33 (SD=3.46) at the pre-test and 20.13 (SD=2.88) at the 3-month follow-up. The difference between the pre-test and 3-month follow-up was statistically significant ($t_{(df=23)}$=3.173, p=0.004). For the control group (n=15) the mean score was 21.0 (SD=3.74) at the pre-test and 21.13 (SD=3.46) at the follow-up. This slight improvement in score was not statistically significant ($t_{(df=14)}$=0.214, p=0.834).

Figure 10 – Falls Behavioral Scale: Cognitive Adaptations Dimension



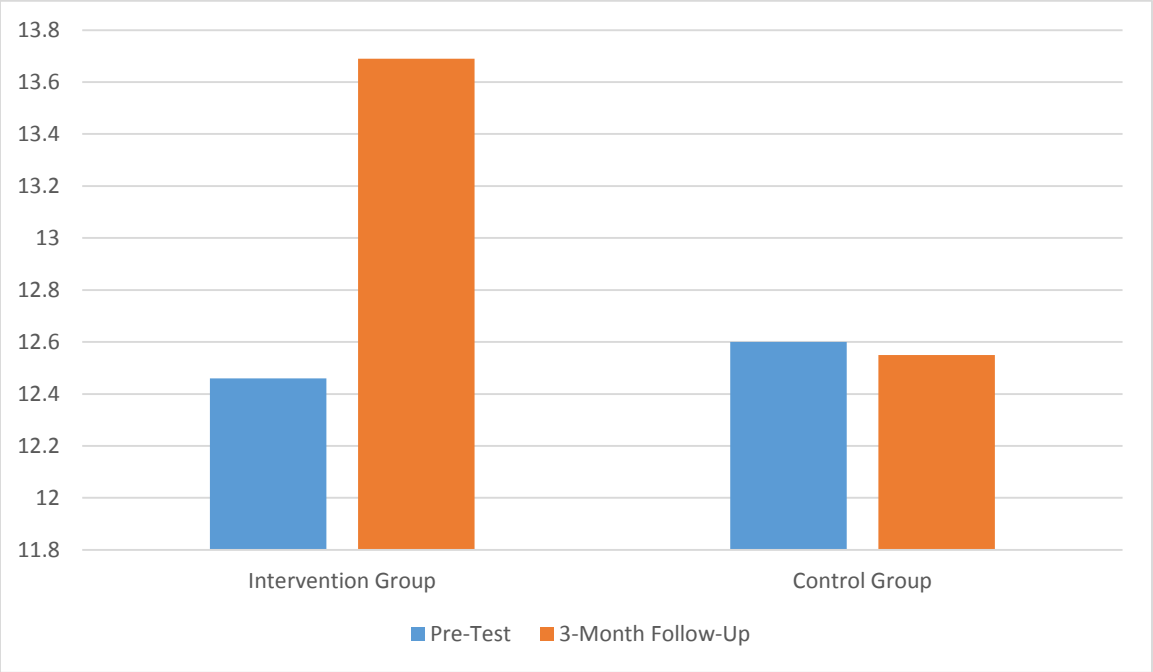

## FaB - Protective Mobility Dimension:

The second behavioral dimension is Protective Mobility and this dimension describes strategies used when negotiating the environment in a supportive or protective manner. It is made up of 5 questions:

- When I stand up, I pause to get my balance.
- I do things at a slower pace.
- I bend over to reach something only if I have a firm handhold.
- I use a walking stick or walking aid when I need it.
- I avoid ramps and other slopes.

For the Protective Mobility scale, possible scores ranged from 5-20. As illustrated in Figure 11, for the intervention group the mean score was 12.46 (SD=3.82) at the pre-test and 13.69 (SD=3.38) at the 3-month follow-up. The improvement in score was statistically significant ($t_{(df=25)}$=2.725, p=0.012). For the control group, the mean score was 12.60 (SD=3.69) at the pre-test and 12.55 (SD=3.66) at the 3-month follow-up. The slight reduction in score was not statistically significant ($t_{(df=19)}$=0.088, p=0.931).

Figure 11 – Falls Behavioral Scale: Protective Mobility Dimension



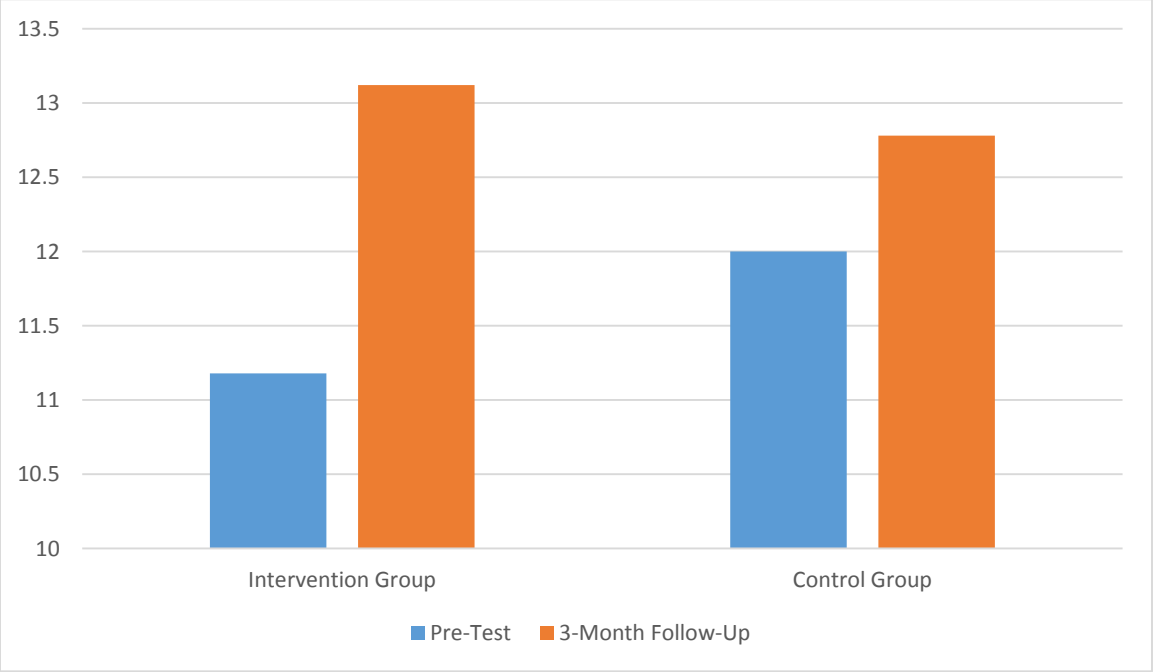

## FaB - Avoidance Dimension:

The third behavioral dimension is Avoidance. The person who scores high on this dimension avoids risky situations. It is made up of 4 questions:

- I get help when I need to change a light bulb.
- I get help when I need to reach something very high.
- I use a night light if I get up during the night.
- I adjust the lighting at home to suit my eyesight.

For the Avoidance dimension, possible scores ranged from 4-16. As illustrated in Figure 12, for the intervention group the mean score was 11.18 (SD=3.23) at the pre-test and 13.12 (SD=2.90) at the 3-month follow-up. The improvement in score was statistically significant ($t_{(df=33)}=4.252$, $p<.001$). For the control group, the mean score was 12.00 (SD=3.32) at the pre-test and 12.78 (SD=3.64) at the 3-month follow-up. The slight increase in score was not statistically significant ($t_{(df=22)}=1.284$, $p=0.212$).

Figure 12 – Falls Behavioral Scale: Avoidance Dimension



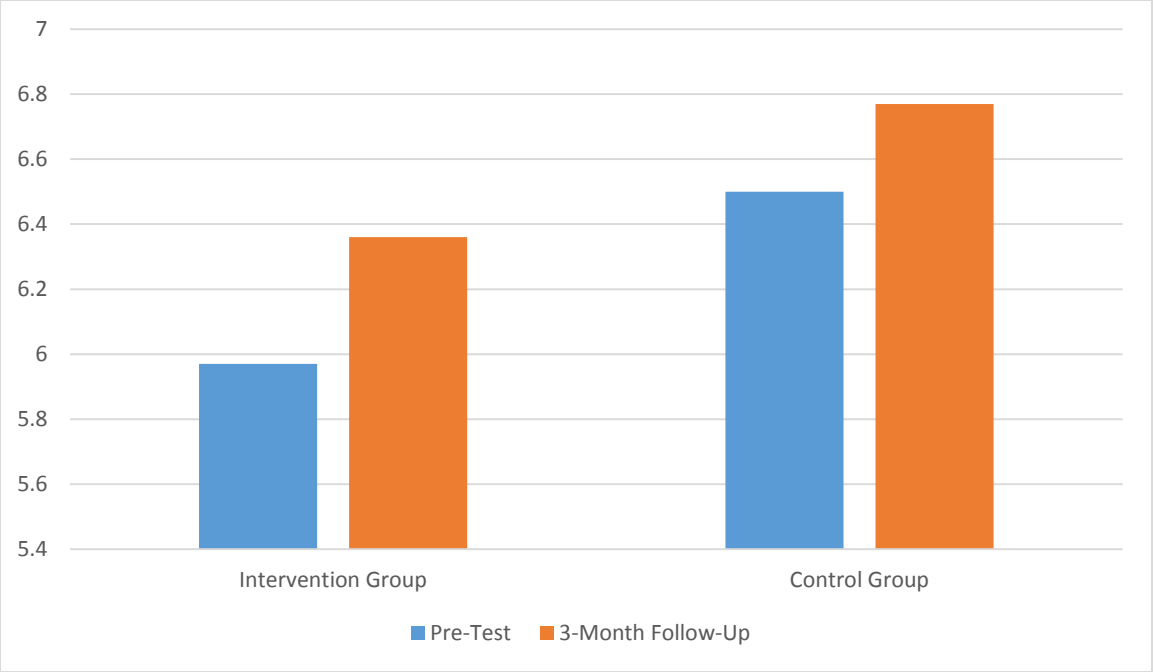
## FaB - Pace Dimension:

The fourth dimension is Pace. The person who scores high on this dimension avoids doing things quickly. It is made up of 2 items which are both reverse-coded.

- I hurry when I do things.
- I turn around quickly.

For the Pace dimension, possible scores ranged from 2-8. As illustrated in Figure 13, for the intervention group the mean score was 5.97 (SD=1.56) at the pre-test and 6.36 (SD=1.48) at the 3-month follow-up. The improvement in score was not statistically significant ($t_{(df=35)}$=1.718, p=0.095). For the control group, the mean score was 6.50 (SD=1.37) at the pre-test and 6.77 (SD=1.39) at the 3-month follow-up. The slight increase in score was not statistically significant ($t_{(df=25)}$=0.762, p=0.453).

Figure 13 – Falls Behavioral Scale: Pace Dimension




## FaB - Practical Strategies Dimension:

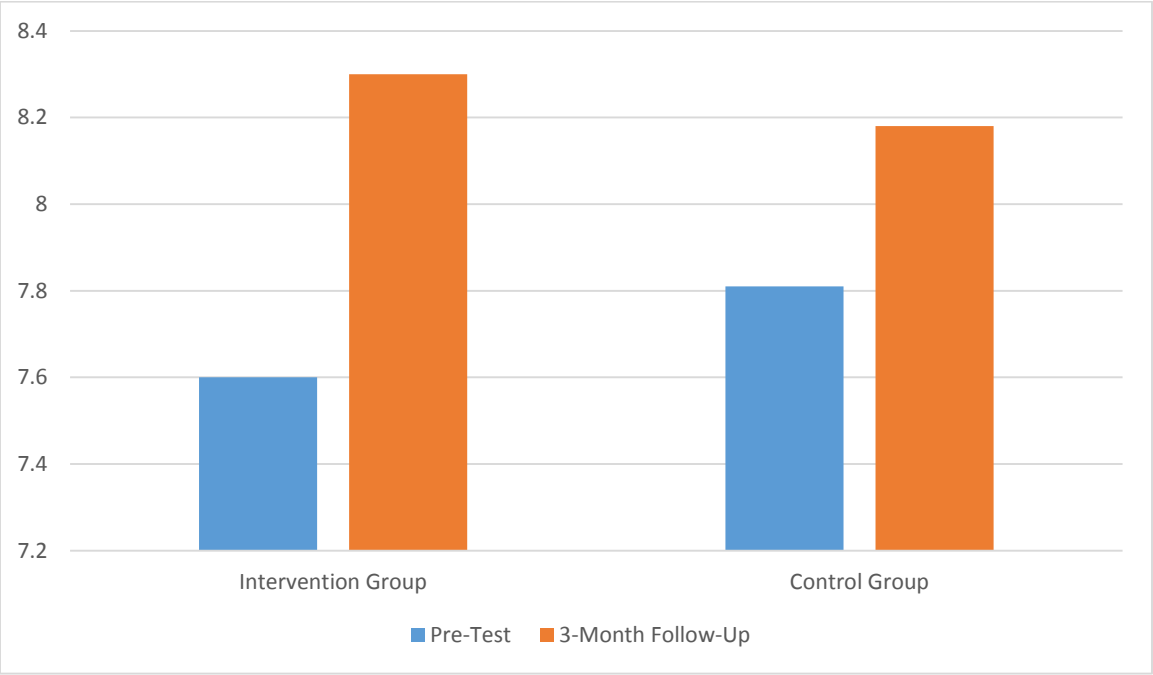
The fifth dimension is Practical Strategies. The person who scores high on this dimension implements practical strategies that often involve anticipation or planning. It is made up of 3 items, 1 of which is reverse-coded.

- I talk with someone I know about things I do that might help prevent a fall.
- To reach something up I use the nearest chair, or whatever furniture is handy, to climb on. (Reverse-coded)
- I avoid walking about in crowded places.

For the Practical Strategies dimension, possible scores ranged from 3-12. As illustrated in Figure 14, for the intervention group the mean score was 7.60 (SD=1.89) at the pre-

test and 8.30 (SD=2.00) at the 3-month follow-up. The improvement in score was statistically significant ($t_{(df=29)}$=2.276, p=0.030). For the control group, the mean score was 7.81 (SD=1.11) at the pre-test and 8.18 (SD=1.47) at the 3-month follow-up. The slight increase in score was not statistically significant ($t_{(df=215}$=0.972, p=0.347).

Figure 14 – Falls Behavioral Scale: Practical Strategies Dimension

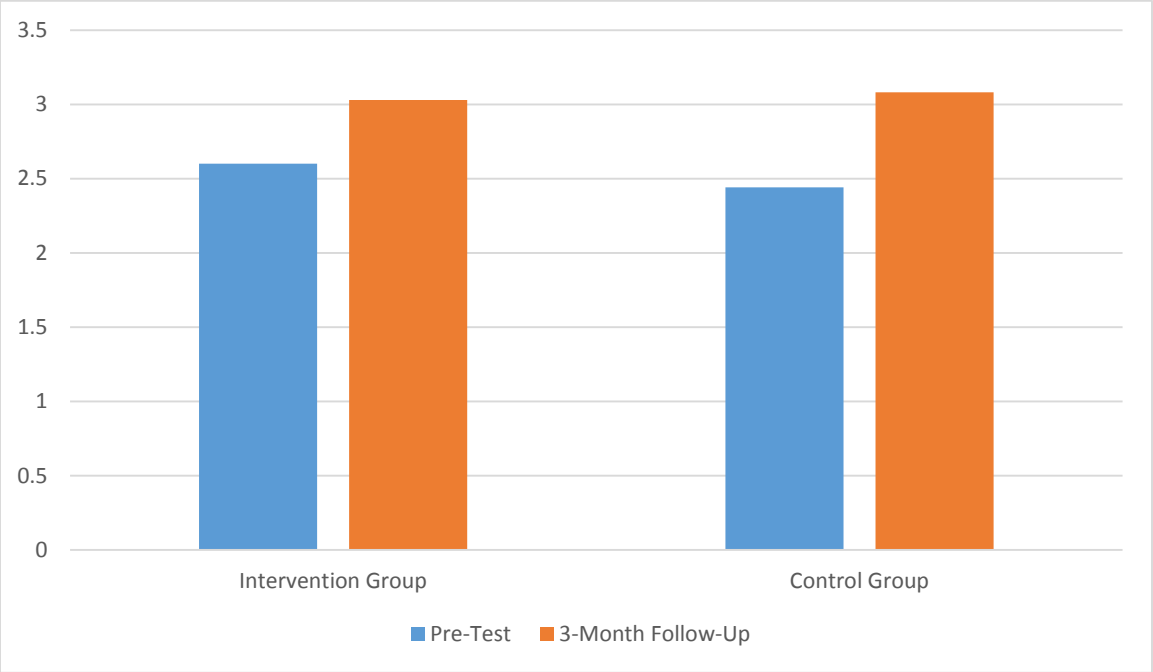



## FaB - Being Observant Dimension:

The sixth dimension is Being Observant. The person who scores high on this dimension is vigilant in looking out for particular hazards. It is based on one question: When I buy shoes, I check the soles to see if they are slippery.

For the Being Observant dimension, possible scores ranged from 1-4. As illustrated in Figure 15, for the intervention group the mean score was 2.6. (SD=1.26) at the pre-test and 3.03 (SD=1.75) at the 3-month follow-up. The improvement in score was not statistically significant ($t_{(df=34)}$=1.932, p=0.062). For the control group, the mean score was 2.44 (SD=1.26) at the pre-test and 3.08 (SD=1.26) at the 3-month follow-up. The increase in score was statistically significant ($t_{(df=24)}$=2.782, p=0.010).

Figure 15 – Falls Behavioral Scale: Being Observant Dimension



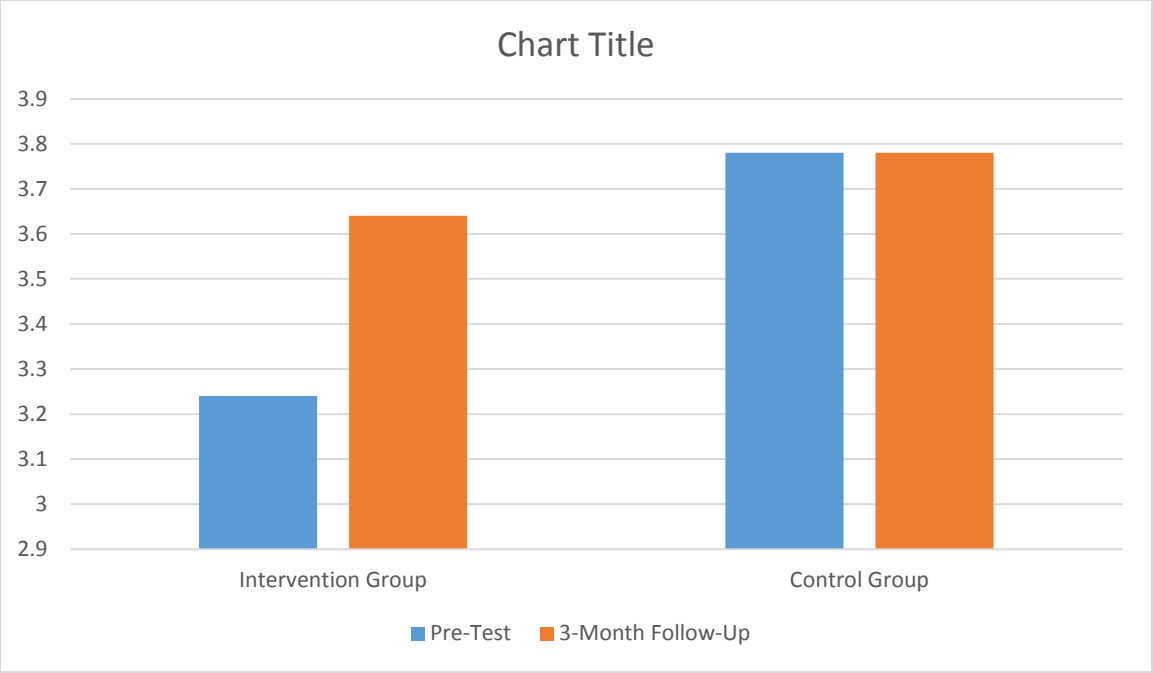

## FaB - Changes in Level Dimension:

The seventh dimension is Changes in Level. The person who scores high on this dimension practices behaviors about coping with changes in levels suggesting the

person has strategies in place to cope with higher activity levels. It is based on one question: When I am getting down from a ladder or step stool I think about the bottom rung/step.

For the Changes in Level dimension, possible scores ranged from 1-4. As illustrated in Figure 16, for the intervention group the mean score was 3.24. (SD=0.88) at the pre-test and 3.64 (SD=0.70) at the 3-month follow-up. The improvement in score was not statistically significant ($t_{(df=24)}$=1.852, p=0.076). For the control group, the mean score was 3.78 (SD=0.67) at the pre-test and 3.78 (SD=0.67) at the 3-month follow-up. The increase in score was statistically significant ($t_{(df12)}$=0.192, p=0.851).

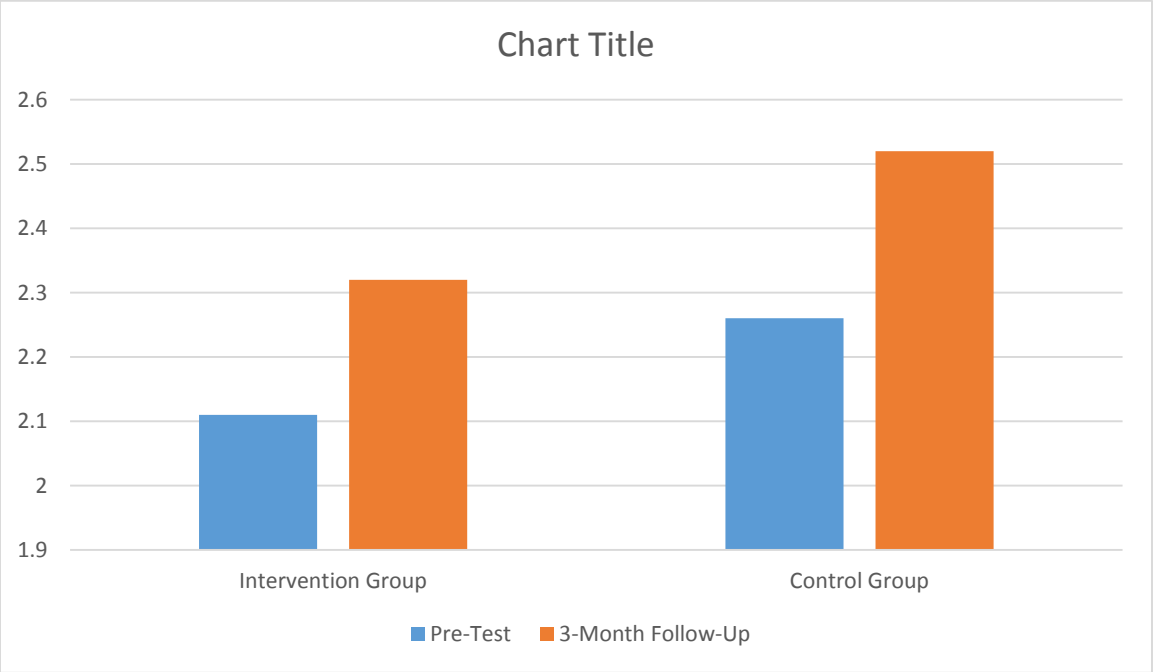
Figure 16 – Falls Behavioral Scale: Changes in Level Dimension



## FaB - Displacing Activities Dimension:

The eighth dimension is Displacing Activities. The person who scores high on this dimension avoids activities that cause displacement, in particular, going out on windy days. It is based on one reverse-coded question: I go out on windy days. For the Displacing Activities dimension, possible scores ranged from 1-4. As illustrated in Figure 17, for the intervention group the mean score was 2.11. (SD=0.99) at the pre-test and 2.32 (SD=1.06) at the 3-month follow-up. The improvement in score was not statistically significant ($t_{(df=36)}$=1.484, p=0.146). For the control group, the mean score was 2.26 (SD=0.96) at the pre-test and 2.52 (SD=0.90) at the 3-month follow-up. The increase in score was not statistically significant ($t_{(df22)}$=1.239, p=0.228).

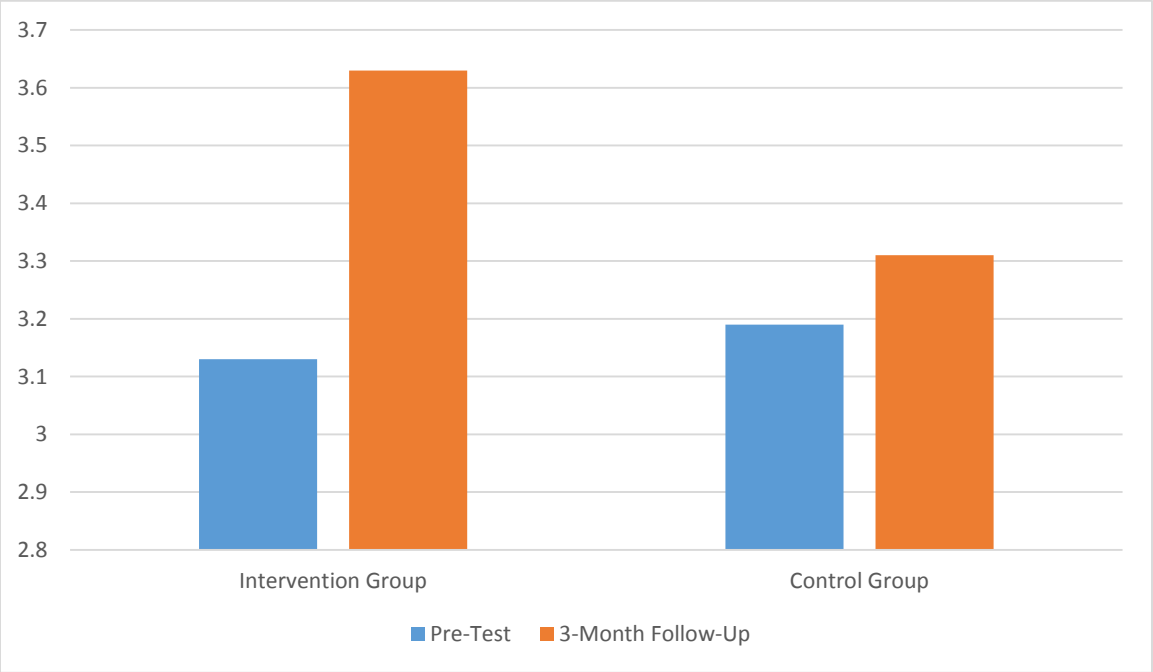
Figure 17 – Falls Behavioral Scale: Displacing Activities Dimension



## FaB - Getting to Phone Dimension:

The ninth dimension is Getting to Phone. The person who scores high on this dimension takes care getting to or reaching for things like the phone. It is based on one reverse-coded question: I hurry to answer the phone. For the Getting to Phone dimension, possible scores ranged from 1-4. As illustrated in Figure 18, for the intervention group the mean score was 3.13. (SD=.93) at the pre-test and 3.63 (SD=0.64) at the 3-month follow-up. The improvement in score was not statistically significant ($t_{(df=35)}$=1.485, p=0.147). For the control group, the mean score was 3.19 (SD=0.90) at the pre-test and 3.31 (SD=0.55) at the 3-month follow-up. The increase in score was not statistically significant ($t_{(df25)}$=0.721, p=0.478).

Figure 18 – Falls Behavioral Scale: Getting to Phone Dimension



## Elimination and Reduction of Fall Risk in the Home

Participants of the intervention group received a home visit from a Certified Aging in Place Specialist to assess fall risks within the home. They also had an assessment completed by an Occupational Therapist who made specific recommendations for home modifications to reduce the risk of falls. These assesssments were followed by a home visit from the People Working Collaboratively group who provided equipment and supplies to assist with lowering fall risk and installed the equipment for the participant.

Table 1 provides a list of safety issues that were assessed by the Certified Aging in Place Specialist and the percentage of participants who had that safety measure in place. Items that had lower percentages included:

- having grab bars near the toilet and in the shower/bathtub
- using a shower seat or bench if they have difficulty standing in the shower
- using a raised toilet set or a comfortable height toilet
- using a handheld shower
- having handrails on stairways

Table 1 - Certified Aging in Place Specialist Whole Home Assessment

| Safety Issue Being Assessed | Percentage with the Safety Measure in Place |
|---|---|
| Path from the bedroom to the bathroom is well lit and clear of obstacles | 76.5 |
| There are grab bars near the toilet and in the shower/bathtub | 39.4 |
| Participant uses a shower seat or bench if they have difficulty standing in the shower | 35.7 |
| Bathmats have slip-resistant backing | 88.2 |
| Soap build-up in your shower/bathtub is removed to avoid slipping | 100.0 |
| Participant can reach soap in the shower without bending down or turning too far | 100.0 |
| Participant uses a raised toilet seat or comfortable height toilet | 36.4 |
| There is a hand held shower? | 57.6 |
| Floor is free of clutter | 97.0 |
| Lighting is adequate | 84.8 |
| Floor coverings are secure with non-skid back | 82.4 |
| Carpet and area rugs and runners are free from frays or folds | 90.9 |
| Participant can answer the phone without getting up | 100.0 |
| Cords are pushed back against wall | 100.0 |
| Light can be turned on without having to walk into a dark room | 100.0 |
| Participant has a cordless or cellular phone or an emergency alarm device | 96.9 |
| Participant can easily walk around the furniture in the home | 97.1 |
| Participant can pull cords to lights or ceiling fans without reaching up | 86.2 |
| There are handrails on the stairways in the home | 39.1 |
| There are lights at the top and the bottom of the stairs | 73.9 |
| There are night lights in key areas | 75.0 |
| The bed is an appropriate height | 100.0 |
| Spills are cleaned up immediately | 100.0 |
| Throw rugs/ floor mats are secure | 94.1 |
| Participant can reach items without bending down or reaching up too far | 90.3 |
| Participant has a step stool that has side rails, is sturdy and is in good condition | 62.1 |
| The sidewalk and driveway are free of cracks and buckles | 94.1 |
| Outdoor walkways are free of obstacles such as hoses, weeds, clutter | 94.1 |
| The path from the house to garage is well lit | 96.7 |
| Outdoor handrails are in place and securely fastened | 60.0 |
| Outdoor steps are in good condition - not cracked, uneven, or broken | 84.0 |
| Participant has a smoke alarm and replaces the batteries regularly | 86.7 |
| Participant has a carbon monoxide detector and replaces the batteries regularly | 75.0 |
| Participant does not report any difficulties with daily activities | 92.9 |
| Pets are not a concern | 84.6 |

Table 2 outlines the safety issues assessed by the occupational therapist. Things that lower percentages of participants could do included:

- Laundry
- Shopping
- House cleaning

- Meal preparation
- Financial management and bill paying

Table 2 - Occupational Therapist Assessment

| Safety Issue Being Assessed | Percentage that Can or Do |
|---|---|
| Can patient manage steps? | 94.4 |
| Can patient manage safely on entrance surface? | 100.0 |
| Can patient manage distance to mailbox | 96.2 |
| Can patient manage distance to street | 95.7 |
| Can patient manage distance to driveway or parking lot | 95.0 |
| Can patient manage distance to garage | 95.2 |
| Can patient open/close, lock/unlock door | 100.0 |
| Can patient reach elevator buttons? | 100.0 |
| Including emergency button | 100.0 |
| Can patient maneuver the hallway corridor | 100.0 |
| Can patient enter rooms from the hallway | 100.0 |
| Can patient transfer safety to toilet | 100.0 |
| Can patient transfer safety to tub/shower? | 100.0 |
| Can patient reach faucets for tub/shower? | 100.0 |
| Can patient reach faucets for sink? | 100.0 |
| Does patient manage lighting adequately? | 95.8 |
| Can the patient access the dining table | 100.0 |
| Can the patient reach and use sink safely | 100.0 |
| Can the patient reach and use stove safely | 96.0 |
| Can the patient access the refrigerator safely | 96.0 |
| Can the patient transfer to chairs safely | 100.0 |
| Can patient get items out of cabinets | 96.3 |
| Can patient transfer into bed | 100.0 |
| Can patient transfer out of bed | 100.0 |
| Can patient access closet | 100.0 |
| Can patient access bureau | 100.0 |
| Can patient access night table | 100.0 |
| Can patient manage phone for emergencies | 100.0 |
| Can patient access telephones | 100.0 |
| Are emergency numbers available by phone | 100.0 |
| Can patient dial 911 or other emergency numbers | 100.0 |
| Can patient communicate need of emergency | 100.0 |
| Can patient hear emergency alarms (smoke detector, etc.) | 95.7 |
| Can patient hear doorbell and phone | 100.0 |
| Can patient self-medicate | 90.9 |
| Is escape plan available to patient | 100.0 |
| Can patient access lighting (switches, lamps, etc) | 100.0 |
| Are windows accessible for patient | 100.0 |
| Access to entertainment items | 100.0 |
| Access to laundry | 25.0 |
| Access to shopping | 30.4 |
| Access to house cleaning | 34.8 |
| Access to meal preparation | 38.1 |
| financial management and bill paying | 42.9 |

The Occupational Therapist also looked specifically at accessibility issues. As Table 3 demonstrates, the majority of participants who use a wheelchair or walker did not have accessibility issues in their home.

Table 3 – Accessibility Issues Identified by the Occupational Therapist

| Accessibility Issues | Percentage with Issues |
|---|---|
| Is bathroom accessible for a wheelchair, walker/assistive device? Any rugs? | 92.3 |
| Is there room for transfer? | 100.0 |
| Is the kitchen/dining area accessible for a wheelchair or walker | 100.0 |
| Is the sleeping area accessible for a wheelchair or walker | 100.0 |
| Is furniture accessible for transfer | 96.3 |

Finally, the Occupational Therapist made specific recommendations for home modifications during the assessment. Table 4 outlines the recommendation made and for what percentage of participants these recommendations were made. Other items of priority for a majority of the participants included hand held showers and non-skid surfaces.

Table 4 – Recommendations Made by Occupational Therapist for Home Modifications

| Recommendations | Percentage Recommendation was Made To |
|---|---|
| Tub seat | 68.8 |
| Grab bars for toilet | 50.0 |
| Grab bars for tub | 46.4 |
| Shower curtain | 100.0 |
| Transfer bench | 60.0 |
| Shower doors | 100.0 |
| Hand held shower | 90.0 |
| Non-skid surface | 80.0 |

Once the home assessments were completed, People Working Collaboratively made home visits to provide and install the recommended safety equipment. Table 5 provides the number of each type of safety equipment provided along with the cost of the item and the labor costs for installing it. The team provided 122 pieces of equipment which cost a total of $4,947.93, which was provided free of charge to the participants. The labor costs associated with the installation of this equipment would have been $5,696.00, but were done free of charge for participants. The Certified Aging in Place Specialist Home visit evaluation were valued at $1800 and were also free of charge. Additional equipment was utilized for program teaching and demonstration purposes.

Table 5 – Home Modifications Made and Associated Costs

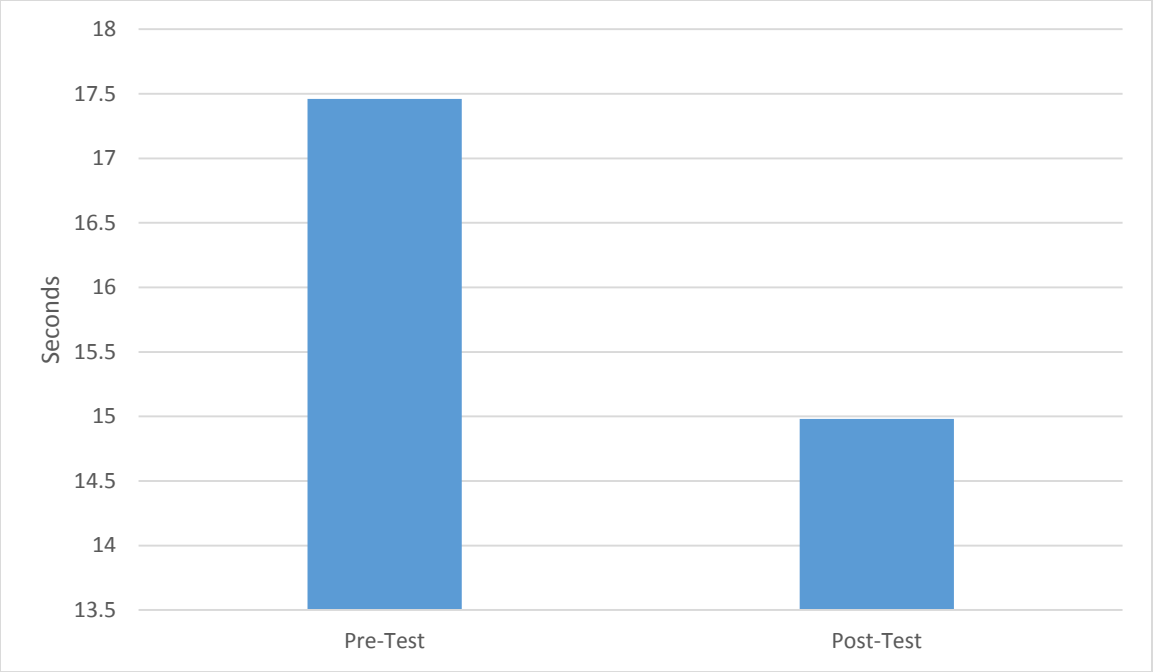
| Home Modifications Provided and Installed | Number | Average Material Cost/unit | Average Labor Cost/install |
|---|---|---|---|
| Grab bars | 53 | | |
| • 16 inch grab bar with solid mount | 1 | $57.50 | $50 |
| • 16 inch grab bar with solid mount and hardware | 2 | $66.99 | $75 |
| • 16 inch curved bar solid mount anchor and additional hardware due to hollow wall | 1 | $85.99 | $75 |
| • 16 inch grab bar curved with secure mount | 4 | $57.25 | $50 |
| • 16 inch designer grab bar | 1 | $45.20 | $50 |
| • 16 inch curved grab bar | 1 | $52 | $50 |
| • 18 inch | 2 | $31.50 | $52.50 |
| • 18 inch grab bar with solid mount | 3 | $42.29 | $54.17 |
| • 18 inch grab bar with secure mount | 7 | $37.22 | $50 |
| • 36 inch grab bar | 1 | $40 | $50 |
| • 24 inch grab bar | 4 | $27 | $31.50 |
| • 24 inch secure mount grab bar | 9 | $40.45 | $50.11 |
| • 24 inch secure mount towel bar/grab bar with secure mount | 1 | $104.99 | $50 |
| • 24 inch designer with mount | 4 | $45.20 | $50 |
| • 32 inch SSP grab bar with secure mount | 1 | $43.00 | $50 |
| • 36 inch grab bar | 1 | $40 | $45 |
| • 36 inch grab bar with secure mount | 3 | $33.33 | $50 |
| • Valvering grab bar with solid mount | 2 | $54.68 | 56.25 |
| • Tub ring grab bar | 2 | $42.5 | $50 |
| • Tub spout ring grab bar with secure mounts | 1 | $44.50 | $50 |
| • Toilet paper holder/grab bar curved | 1 | $127.98 | $100 |
| • Toilet paper grab bar | 1 | $52 | $50 |
| Grip texture on living room transition | 1 | $21.50 | $32.50 |
| Yellow tape for kitchen transition | 2 | $10.75 | $16.25 |
| Nightlight (standard) | 14 | $15 | 0 |
| Nightlight (motion sensor) | 4 | $30 | 0 |
| Paint on concrete for visual contrast | 1 | $37.50 | $82.50 |
| Handheld shower holder | 2 | $30 | $12.50 |
| Repair garage steps | 1 | $2 | $25 |
| Grip texture for tub entry | 1 | $43 | $65 |
| Install pipe railing by garage door | 1 | $55 | $100 |
| Install pipe rail at back door | 2 | $65 | $112.50 |
| Install pipe rail | 1 | $85 | $100 |
| Install 10 inch pine railing with brackets for basement steps | 1 | $50 | $100 |
| Relocate mailbox to same side of street (to avoid crossing busy road) | 1 | $36 | $200 |
| Folding tub seat | 2 | $40 | 0 |
| Secure handrails | 2 | 0 | $50 |
| Step cote on front steps | 3 | $45 | $150 |
| Install tread strips on stairs | 1 | $37.50 | $82.50 |
| Install tread strips in tub | 1 | $3 | 0 |

| | | | |
|---|---|---|---|
| Toilevator | 2 | $122.50 | $100 |
| Safe bath rug | 1 | $20.00 | 0 |
| Smoke detector | 7 | $6 | $7.14 |
| Carbon Monoxide detector | 5 | $22 | 0 |
| Outside rail front | 2 | $112.50 | $100 |
| Railing basement steps | 2 | $112.50 | $100 |
| Toilet assist rail with new seat | 1 | $23 | $25 |
| Long Reachers | 2 | $22.99 | 0 |
| Add new step off deck | 1 | $92 | $400 |
| Superpole (mounted on back porch for safe step) | 1 | $260 | $100 |
| Handheld shower | 1 | $35 | $50 |
| Remove shower door/caulk/install tread strips | 1 | $12 | $75 |
| Remove shower door, install rod, curtain and rings | 1 | $30 | $50 |
| Reverse gate swing back patio and build railing at back steps | 1 | $75 | $345 |

## Improved Balance

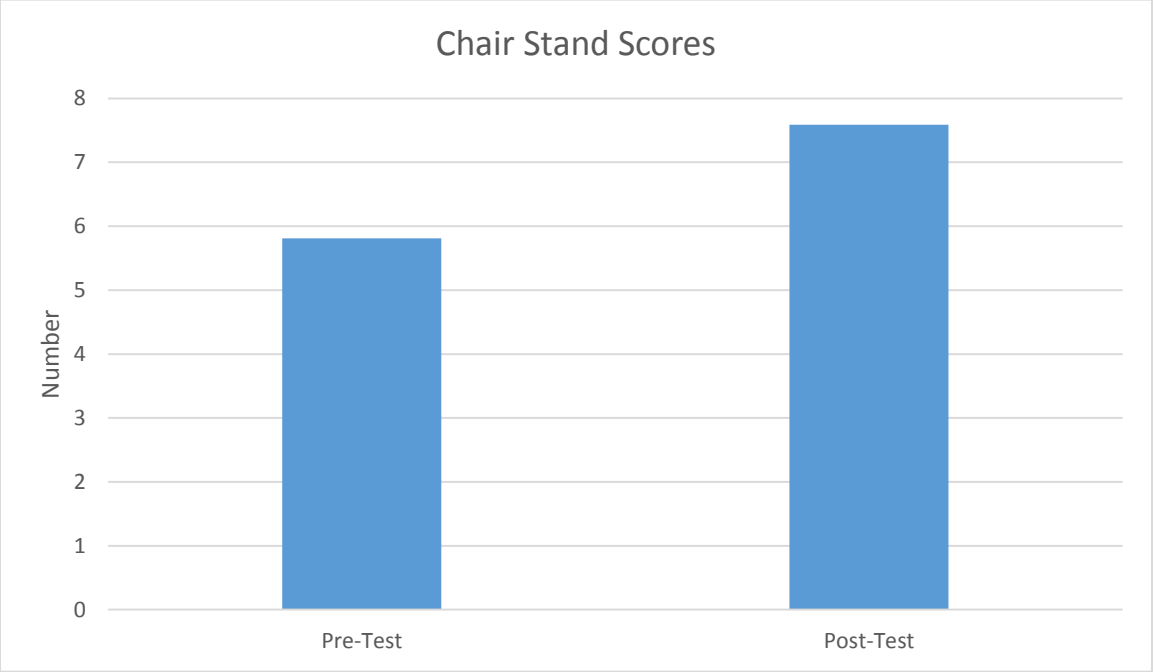
Balance was assessed in the intervention group using 2 tools. The first was the Timed Up and Go (TUG) Test. The purpose of the test is to assess mobility. To complete the test the person administering the test uses a stopwatch to time how long it takes the participant to get up from a sitting position in a standard arm chair, walk 3 meters to a point indicated on the floor, turn and walk back to the chair and sit down again. An older adult who takes 12 or more seconds to complete this test is at high risk for a fall. TUG Test scores improved significantly from pre- to post-test ($t_{(df=36)}=5.597$, $p<.001$). At the pre-test the mean score was 17.46 seconds (SD=10.53) and at the post-test the mean score was 14.98 seconds (SD=9.60). This was an average improvement of 2.48 seconds (SD=2.70).

Figure 19 – Timed Up and Go Test Results




The second assessment used was the 30-Second Chair Stand Test. The purpose of this assessment is to test leg strength and endurance. The person administering the assessment has the participant sit in a chair with a straight back and no arm rests (seat 17" high) and place their hands on their opposite shoulders crossed at the wrists. The participant is instructed to keep their feet flat on the floor and keep their back straight and their arms against their chest. They are then asked to rise to a standing position and sit back down again and to repeat this action for a total of 30 seconds. The higher the number of times this action can be completed, the lower the fall risk. 30-Second Chair Stand scores improved significantly from pre- to post-test ($t_{(df=36)}=4.671$, $p<.001$) as can be seen in Figure 20. At the pre-test the mean score was 5.81 times (SD=4.59) and at the post-test the mean score was 7.59 times (SD=5.04). This was an average improvement of 1.78 times (SD=2.32).

Figure 20 – 30-Second Chair Stand Scores




# Conclusions

This study provides support that the Stepping On program is effective at reducing fall risk and falls in older adults. The self-reported number of falls in the intervention group was significantly lower at follow-up, whereas the decrease in the control group was not. Likewise, there were statistically significant improvements in the intervention group, but not the control group, in several of the dimensions of the Falls Behavioral Scale: Cognitive Adaptations, Protective Mobility, Avoidance, and Practical Strategies. Improvement in these scales indicates that particpants are practicing behaviors that are associated with a reduced risk of falls. The Stepping On program emphasizes exercise

and improving balance. The Timed Up and Go Test and the 30-Second Chair Stand Test demonstrated significant improvements in mobility and balance in the program participants. Another important issue illustrated in this study are the number of home modifications that need to be made to reduce the risk of falls in older adults. In this study, many of the participants needed safety features added to their home, but had not previously done so. The fact that these modifications were provided at no cost to them and that there some was someone to provide the installation was key. Many older adults on a fixed income cannot afford safety equipment and do not have someone to do the installation for them or the money to pay someone to do the installation.

The limited number of participants and the limited amount of time for this study did limit the conclusions that can be drawn in regard to a reduction in 911 calls, ER visits, and hospitalizations due to falls. However, the research referenced in our literature review has shown that those with better balance and mobility, who are more aware of techniques for preventing falls, and who create a home environment that reduces the risk of falls are less likely to experience falls. This study did demonstrate a reduction in self-reported falls, increased behaviors associated with fall risk reduction, and improved balance and mobility. These factors coupled with the numerous home improvements made will hopefully lead to a reduction in falls over the upcoming years.

# Recommendations

Based on the results of this study it is evident that falls in the older population need to be addressed in an innovative way that involves the healthcare system, the emergency

medical services system, community based health promotion as well as a transformation in the way that healthcare looks at falls in seniors.

This research study has provided the impetus for the researcher to seek additional funding for a transformational healthcare grant to address fall risk identification, referral, as well as community based education for this vulnerable population of seniors. Generous funding has been obtained by Bethesda Inc. as of July 2015. A transformational process to address falls is being developed in Cincinnati at this time with plans to partner across the state for widespread dissemination and training in Stepping On, as well as risk identification and referral practices for fall prevention that can be integrated into the healthcare system as well as the electronic medical record. This developing process will help to provide a seamless continuum of care, risk identification and referral for older adults and will change the way that falls are addressed in healthcare and in the community.

## Key Recommendations for Practice

- The Stepping On program emphasizes exercise as a way to reduce falls and allows time during the classes for participants to practice the exercises. Emphasizing exercise and encouraging people to maintain exercise is crucial for reducing fall risk.
- Home modifications are important for reducing the risk of falls. Fall prevention programs should educate participants about the types of safety equipment available and provide resources or referrals to get safety equipment and to have it installed.

- Changing some key behaviors like not rushing to get the phone or taking the time to use a step stool to reach things can make a big difference in regard to fall reduction and often can be changed by improving awareness.

## Key Recommendations for Future Research

- Ensure larger sample sizes to provide enough power to run statistical analyses.
- When possible, follow-up for longer periods of time to track falls over the years in intervention versus control groups.
- Add quality of life measures to examine other benefits of fall prevention programs like increased independence, confidence, and ability to do tasks of daily living.

## Financial Issues and Considerations

- **For the State of Ohio as well as the Ohio Hospital Association to work with insurers and self- insured companies to incorporate Evidence Based Fall Prevention Programs for their employees, insured and retirees as a means of potential healthcare cost reduction.**
- **Work at the state level to provide tax incentives for basic home modifications for seniors age 65 and older for fall risk reduction.**
- **For the State of Ohio to obtain a large scale funding for statewide training and dissemination of the Stepping On Program**
- **For the State of Ohio to establish the Buckeye State as the leader in innovation in the Whole Home Approach via People Working Cooperatively conducting statewide training in this approach for professionals.**
- **To incorporate the Emergency Medical Services community statewide as a partner in fall prevention risk identification, education and public awareness to reduce the burden of falls on the system of care.**
- **For healthcare systems across the state to join together in providing a more systematic approach to fall risk identification, reduction, referral and follow up for the health and safety of seniors in our state.**
- **If home visit evaluation, equipment and installation costs for thirty seven people costs slightly more than the average direct cost of a fall for one person within the TriHealth system, isn't this cost benefit analysis worthy of future consideration? The investment outweighs the cost.**

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