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# The Impact of Education on Fear of Falling in Elderly Women

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Running Head: FEAR OF FALLING IN ELDERLY WOMEN

The Impact of Education on Fear of Falling in Elderly Women

A thesis submitted in partial fulfillment  
of the requirements for the degree of  
Bachelors of Kinesiology

by

Whitney Muller

Graduation May 2016  
University of Arkansas

## FEAR OF FALLING IN ELDERLY WOMEN

### **Introduction**

More than one third of individuals 65 and older will fall this year and approximately 85% of those falls will occur in the homes of elderly individuals living independently (Tinetti & Powell, 1993; Walker & Howland, 1990). Half of the falls are not the first fall experienced by the individual, and 10% of falls result in serious injury. Among the elderly population falls are the reason behind 10% of all hospital visits and falls are the sixth leading cause of death among older adults as well as the leading cause of accidental death in the home. Falls can lead to an increased fear of falling, defined as a pervasive concern that a fall may occur. A fear of falling, many times, leads to the discontinuation of tasks that an individual is still capable of completing. Fear of falling decreases quality of life due to a lower sense of well-being, limiting mobility, and reduction of social interaction. In fact, older adults report fear of falling as their greatest concern over being robbed, experiencing financial difficulty, and having a serious health problem (Lach, 2005). A fall can cause restricted movement, decreased ability to perform activities of daily living, and increase the risk of admittance into a long term care facility. Studies have shown that fear of falling increases with age and is more common in women. Within the population over 75 years of age, 48% of individuals who experienced a fall within the last year and 27% of those who had not fallen report a fear of falling (Tinetti & Powell, 1993). These statistics indicate that a fall is not essential to development of a fear of falling.

Self-efficacy, which is defined as an individual's belief about their ability to complete tasks in a particular domain, is a tool that can be utilized to determine the origin of fear of falling (Tinetti & Powell, 1993). The lower an individual's self-efficacy is with regard to a specific activity, the less likely he/she will perform that activity. For example, if an individual has a fear of falling and a low self-efficacy regarding physical activity that individual will likely restrict

## FEAR OF FALLING IN ELDERLY WOMEN

their activity level. Unfortunately, lower activity levels increase the risk of falling and in turn can increase the fear of falling. Self-efficacy levels can be influenced by the presence or absence of skills regarding a certain task, observation of other's experiences, and by social influence. Social persuasion can be a strong driving force when family members, health care providers, or friends unintentionally discourage independence and cause elderly individuals to question their ability to perform tasks independently. This can lead to a decrease in self-efficacy and the development of a fear of falling.

It is imperative to develop ways to either prevent or correct the development of a fear of falling in the elderly population. Fear of falling can lead to serious implications in the quality of life of an elderly individual. Many approaches have been used to decrease the fear of falling such as exercise interventions, balance training interventions, and education programs. It has been shown that increased physical activity leads to a decrease in falling (MacRae et al., 1996; Schoenfelder, 2000). When the effects of an educational program and a physical activity program on fear of falling were compared, the results indicated that both methods are effective in improving balance confidence and reducing fear of falling (Brouwer et al., 2003). There are mixed results, however, in how effective an education only intervention is on fear of falling. Educational interventions consisting of printed materials and telephone counseling sessions are no more effective at reducing the fear of falling in elderly adults than non-fall related materials (Rucker et al., 2006). Multi-week educational interventions to reduce the fear of falling have been shown to be an appropriate mode of action to improve falls efficacy (Brouwer et al., 2003; Nick et al., 2013). There is also little to no information on how interventions affect individuals with different levels of physical activity. Physical activity level is often determined by self-report of the individual. It has yet to be determined if activity level assessed by a technology such as

## FEAR OF FALLING IN ELDERLY WOMEN

activPAL has an effect on results. These gaps in the literature lead to the question: is there a difference in fear of falling between low and high activity level as determined by activPAL technology, and how does an educational program affect these groups respectively?

### **Literature Review**

The fear of falling is a prevalent issue among older adults. This issue has become a widespread subject in public health literature. More than one-third of the population 65 years and older experience a fall each year (Tinetti, 2003). Half of these individuals who experience a fall will experience subsequent falls. One in 10 falls result in serious injury to the individual. Falls make up 10% of emergency room visits and account for 6% of urgent hospitalizations in the elderly population. Falls are related to restriction of activity, a decline in the ability to complete activities of daily living, and increased risk of admittance to a long term care facility. Many factors have been identified as predictors for developing a fear of falling. Three risk factors have been determined for predicting a fear of falling: poor health status, feeling unsteady, and having two or more falls (Lach, 2005). Within the population studied, there was a 2:1 ratio of women to men. There is a higher rate of fear of falling in women than in men. Of the women studied, 26% reported a fear of falling. This indicates that fear of falling is a significant problem for a large number of elderly women. These known risk factors; poor health status, feeling unsteady, and having two or more falls can be used to develop the intervention to counteract the risks. Another area of interest regarding fear of falling is what characteristics lead to restriction of activity in older adults. Fear of falling can often become debilitating due to restriction of activity, loss of independence, and a decreased quality of life. Certain characteristics can distinguish older adults who restrict activity due to fear of falling from older adults with a fear of falling that do not restrict activity (Murphy et al., 2002). This indicates that a fear of falling does not necessarily

## FEAR OF FALLING IN ELDERLY WOMEN

lead older adults to restrict activity. It has been indicated that poor health status, slow recorded times regarding physical activity, activities of daily living disability, and poor psychosocial function were linked to restriction of activity. Within the participants that reported a fear of falling, history of a fall resulting in injury, two or more chronic conditions, and depressive symptoms were also linked to a restriction in activity. Older adults with poor health status, chronic conditions, and depressive symptoms are more likely to restrict activity than those with a fear of falling alone. Restriction in activity can lead to a significant decrease in quality of life in older adults. Inability to perform activities of daily living and continue an independent, active lifestyle can lead to depressive symptoms, lowered self-confidence, and loss of social interaction. Many of these factors compound upon each other to significantly decrease the quality of life in older individuals all as a result of fear of falling. Another major concern related to fear of falling is falls that result in injury. Salkeld et al. assessed women 75 years or older who had sustained a hip fracture after a fall to determine the quality of life after the fall(s) (2000). Women who had experienced two or more falls (or one resulting in a hospital visit) within the last year. Hip fractures are a very common injury that result from a fall in elderly persons. Hip fractures are a major cause of death in the elderly population. About 20% of people who fracture their hips die within a year of the event. Hip fractures are a major threat to overall health and quality of life due to the fact that many of those who recover from a hip fracture require assistance with activities of daily living. A survey used by Salkeld et al. showed that 80% of women would prefer death to a loss of independence and decrease in their quality of life (2000). A decrease in quality of life can be life threatening to individuals in the elderly population.

As an individual ages it becomes increasingly difficult to maintain the complex postural control system that maintains the body in an upright position (Yates & Dunnagan, 2001). This

## FEAR OF FALLING IN ELDERLY WOMEN

decline in postural control makes it increasingly more difficult to avoid falls. As people age, they tend to spend more time in their homes (El-Faizy & Reinsch, 1994). Many times the home becomes a dysfunctional space due to lack of environmental features that allow older adults to live safely while maintaining independence. Of the falls that occur every year, around 85% occur in the home of older individuals living independently (Walker & Howland, 1990).

Environmental factors are common causes of falls in the younger elderly, between 65 and 75 years of age, and falls are the leading cause of accidental death in the home. It is important to identify and mediate fall hazards within the home. Older adults can be educated on how to identify and eliminate environmental hazards such as throw rugs and poorly lit areas through home safety check lists. The Home Safety Self-Assessment Tool (HSSAT) was developed specifically for older adults and their caregivers to assess hazards in the home and how to remove them (Tomita et al., 2014). The HSSAT includes visuals of various areas of the home with potential hazards and provides ways to alleviate them. The HSSAT can be used by older adults, caregivers and family, and professionals such as occupational therapists to remove fall hazards from the home. Tomita et al. concluded the HSSAT as a reliable and valid way to assess fall hazards in the home. Since the majority of falls occur within the person's home, adherence to home safety recommendations is an issue that needs to be addressed. It is possible that visible safety changes to the home such as grab bars and extra hand rails introduce an age stigma and can lead an older adult to feeling helpless (El-Faizy & Reinsch, 1994). The main reason for nonadherence to home modification suggestions is older individuals not agreeing that the modifications are necessary (Cumming et al., 2001). Cumming et al. found that perceived need for home modifications was the strongest predictor for adherence to suggested modifications. Adherence was also found to be higher when older individuals felt they had control over their

## FEAR OF FALLING IN ELDERLY WOMEN

home environment. Support from family and friends can also benefit from adherence to environmental modifications. El-Faizy and Reinsch concluded that fall prevention home adaptations should be practical, feasible, affordable, and compatible to each individual's unique needs within their home environment.

Self-efficacy can be defined as an individual's perception of his/her own ability within a particular area of activity (Tinetti & Powell, 1993). That is, an individual's confidence in his/her ability to perform a certain activity. An individual with low self-efficacy in a particular area will usually avoid activities associated with it. Self-efficacy can be influenced by many factors such as the presence of skills in a particular area, past experience, observation of others, and social persuasion. This shows that self-efficacy can be determined by the influence of others as well as individual traits. The Falls Efficacy Scale International (FES-I) utilizes the definition of fear of falling as: low self-efficacy regarding the ability to avoid falls when performing non-hazardous activities of daily living. With this definition, fear of falling can be defined as having low falls-efficacy. That is, an individual does not have the confidence that he/she can perform simple tasks without falling. Tinetti et al. identifies many advantages to defining fear of falling as low self-efficacy. First, the concept of self-efficacy is based upon cognitive processes that underlie emotion. Second, there are effective, reliable measures of efficacy. Finally, fear is often synonymous with phobias which may not be the best way to define fear of falling. As mentioned above, efficacy can be influenced by many factors such as the influence of others and the observation of others. This leads to the conclusion that an individual does not need to experience a fall to have low falls-efficacy. It is possible for an individual to develop a fear of falling simply by hearing about a friend who has fallen or witnessing another older adult experience a fall. Tinetti and Powell found that slow usual walking pace, past experience of difficulty getting up

## FEAR OF FALLING IN ELDERLY WOMEN

from a fall, and anxiety are also factors that contribute to low falls-efficacy. The cause of low falls-efficacy often has multiple, intertwined causes. These factors often work together to create a generalized fear of falling. Tinetti and Powell also indicated that family members, health care providers, and friends can discourage independence and lower self-efficacy. By encouraging older adults to be careful to avoid falls and completing tasks that they are capable of doing themselves, family members, health care providers, and friends can often cause elderly individuals to question their ability to perform certain tasks. This questioning of ability often leads to lower self-efficacy. Low falls self-efficacy can lead to many problems, however, Li et al. found that falls self-efficacy has a significant positive impact on functional balance and physical functioning tests. This indicates that high falls-efficacy leads to better performance in balance and physical tasks. Balance and physical ability are crucial to preventing falls. This indicates that higher falls-efficacy can lead to the prevention of falls. Li et al. also indicated that fear of falling interventions should focus on enhancing self-efficacy by improving physical skills and levels of activity to prevent excessive fear of falling during activities of daily living.

Regular physical activity is recommended to maintain a healthy lifestyle and decrease the risk of cardio-vascular disease, type II diabetes, osteoporosis, anxiety, and depression (Bruce et al., 2002). As an individual ages, the risk for these conditions increases drastically. For older adults, participation in regular physical activity also leads to benefits such as a longer lifespan, reduced arthritis pain, reduced risk of falls and fractures, and an increased ability to maintain an independent lifestyle. Despite the benefits, however, 50% of women 75 years and older participate in no physical activity beyond activities of daily living. Older women, on average, participate in half the amount of moderate and vigorous activity as young women (Lord et al., 2011). Physical activity and fear of falling are intertwined. A sedentary lifestyle can lead to

## FEAR OF FALLING IN ELDERLY WOMEN

reduction in activity and poor balance which can lead to a fall and cause a fear of falling. A fear of falling can cause activity restriction, but fewer active women report a fear of falling. Although active women report fear of falling less often, 25% of active women still report having a fear of falling (Bruce et al., 2002). This indicates that fear of falling can exist even in active women who have never experienced a fall. Because physical activity and fear of falling are so entwined, it is important to look at the effects of an intervention on fear of falling with respect to activity level. Self-report data, however, is often unreliable. Self-report data on sedentary behavior was found to be underestimated by 9 minutes per day (Fitzsimons et al., 2013). Because self-report data can be unreliable, a device such as an activPAL monitor can be used to record activity level. An activPAL monitor is able to record total walking time (volume), active and sedentary behavior, frequency of sit to stand transitions, and steps taken (Lord et al., 2011). A discussion approach that utilized activPAL data was effective in reducing sedentary time in older adults. Time spent sitting/lying daily was reduced by 24 minutes in 24 hours over a 2-week period and the intervention increased stepping time by 13 minutes per day (Fitzsimons, 2013). While physical activity is important for older adults to maintain a healthy lifestyle, beginning physical activity may be more challenging and longer rest periods may be required between bouts of activity (Lord et al., 2011). It is also likely that many older adults move more slowly and shuffle their steps as they walk. Taraldsen et al. concluded that activPAL monitors underestimated step counts when placed on the leg of an individual with shuffled steps, legs affected by hip fracture, and legs affected by acute stroke (2011). It has been suggested that the activPAL monitor should be placed on non-affected legs for the best accuracy in step count (Taraldsen et al., 2011). Despite the underestimation of step count in individuals with affected lower limbs, the use of activPAL monitors was deemed an accurate mode of activity measurement in older adults.

## FEAR OF FALLING IN ELDERLY WOMEN

Fear of falling and low falls-efficacy have clearly been defined as a problem among older adults. Falls have both physical and mental costs. There is growing research indicating that exercise is effective in offsetting age-related losses in strength and balance. Exercise has also been shown to improve joint flexibility especially in the ankles and knees. One approach to mediate the problems associated with fear of falling is a walking program (MacRae et al., 1996; Schoenfelder, 2000). Walking requires adequate balance and is an activity most older adults are able to participate in. Walking programs have been shown to have an effect on endurance capacity, activity level, mobility, and quality of life in mobile nursing home residents. In cases in which programs were extended past 12 weeks there was no indication that the longer duration created better results. There was also no indication that the walking programs affected the number of falls the participants had. Walking programs address the issue of fear of falling that results in decreased activity level. The walking programs lead to increased self-efficacy in regards to walking and physical activity, and aid older individuals in returning to normal activities of daily living and improve their overall quality of life. Walking programs have helped determine the role of exercise in preventing falls and reducing participant's fear of falling.

While walking programs have been shown to have many positive results, fear of falling has multiple causes. Due to the complicated etiology of fear of falling, alternate approaches such as education programs have been utilized to reduce the fear of falling in older adults (Brouwer et al., 2003; Rucker et al., 2006; Nick et al., 2013; Deery et al., 1999; Legters, 2002). It has been shown that fear of falling can be impacted by behavior change modifications rather than physical modifications alone. Education programs are enhanced by strategies that increase perceived control over the environment which allows individuals to reduce fall risk and increase activity levels. Environmental modification through home safety checklists and information to

## FEAR OF FALLING IN ELDERLY WOMEN

recognize potential hazards in the environment have been utilized to increase perceived control over the environment in older adults. Assertiveness training has also been used to teach elderly individuals how to ask for help, discuss their fear, and develop an appropriate support system. Research indicate that those who attended the information sessions had high knowledge about the factors to prevent falls. The education interventions resulted in more individuals making changes to their home and environment to prevent falls. An 8-week fall prevention class was shown reduced fear of falling by 26.5% and improved balance by 4.3%. Educational programs that allowed for social interaction and discussion between the participants about their fear of falling and environmental hazards led to favorable effects on fear of falling and balance confidence. Education classes included lectures, discussions, worksheets, and handouts. Education intervention showed improvement in postural balance and reduced fear of falling. Social support and communication about falling are important for studies regarding fear of falling and improving mental well-being.

In conclusion, fear of falling is a major concern among older adults. Home environmental safety is very important in preventing falls. Information must be given in a way that encourages adherence to home safety modifications. Improving falls self-efficacy in older adults is crucial to maintaining an active lifestyle. It has been concluded that an intervention of printed leaflets and telephone counseling is no more effective than non-fall related materials in preventing falls or fear of falling. However, both activity and education based programs have been shown to result in increased balance confidence in all participants independent of the program they participated in. Participants in the exercise program were more likely to resume activities they had previously stopped due to their fear of falling than those who participated in the education program. While the participants in the education program showed more improvement in areas of mental health.

## FEAR OF FALLING IN ELDERLY WOMEN

A multi-faceted educational program that utilizes balance training should be effective in reducing the fear of falling in older adults. This study utilized balance training exercises, the HSSAT to encourage home modifications, discussions on fall experiences as well as fall scenarios, work sheets, and hand-outs. The purpose of the study was to determine how an educational intervention that utilizes balance training and home safety assessments impacted fear of falling in elderly women at different activity levels based on the results from activPAL technology.

### Methods

#### Subjects

Eight women 65 years of age and older were included in this study (IRB approved, 15-08-078). Women were the target population due to the fact that the fear of falling is more common in women than in men (Lach, 2005).

Table 1.

Subject Demographics	
	n = 8
Age (yrs)	79.1(5.4)
Height (cm)	161.7(6.2)
Weight (kg)	61.1(9.7)

*Note:* ( ) = SD

#### Procedures

This study utilized the Falls Efficacy Scale International (FES-I), materials from Stepping On: Building Confidence and Reducing Falls, a Community-based Program for Older People, the

## FEAR OF FALLING IN ELDERLY WOMEN

Home Safety Self-Assessment Tool (HSSAT), and materials from the Falls Prevention Project: Stay Safe, Stay Active. An educational intervention was staged for each woman after she wore an activPAL monitor for one week (Taraldsen et al., 2011). activPAL monitors were worn on the thigh and measured sitting/lying, standing, walking time, transition counts, and step counts. This device recorded the number of times the individual wearing it transitioned from one activity (sitting/lying, standing, or walking) to another and the number of steps the individual took per day. According to the American College of Sports Medicine (ACSM) individuals must complete 150 minutes per week of moderate activity to be considered physically active. The data gathered from the activPAL monitors were used to stratify the participants into low, moderate, and high activity levels. Activity level was determined by walking time as recorded by the activPAL monitors along with the ACSM guidelines. The participants who met or exceeded 300 minutes of walking time were placed in the high activity level group. Participants who had less than 150 minutes of walking time were placed in the low activity level group. The participants who walked between 150 and 300 minutes of walking time were placed in the moderate activity level group. Each participant completed the FES-I prior to wearing the activPAL to determine initial fear of falling. FES-I scores range from 16 to 64 with 16 indicating the lowest fear of falling and 64 indicating the highest. Following the initial assessment, each individual completed the educational intervention program in a one-on-one session. Scenarios were utilized that allowed participants to see what situations can lead to a fall and ways to prevent them were discussed. The session also taught balance exercises to instill confidence in the participants. The balance exercises worked on ankle, knee, and calf strength. Next, the session utilized the Home Safety Self-Assessment Tool that identified potential hazards in the home. Once potential hazards were identified solutions to these problems were discussed. The session then discussed how to get up

## FEAR OF FALLING IN ELDERLY WOMEN

safely if a fall were to occur. Finally, general safety precaution guidelines were utilized to go over moving about safely. A quiz activity asked questions on appropriate actions to take to avoid a fall and fall scenarios. Finally, materials that discussed proper footwear, how to move about safely in public settings, and how to safely utilize public transportation were presented and discussed.

### **Statistical Analysis**

At the end of the education session, participants re-took the FES-I and scores were compared to pre-intervention scores (Figure 1 and Table 2). A dependent t-test revealed that the mean difference between pre and post FES-I scores was -1.9 and a p-value of .58 (Table 2). The results of the dependent t-test were not significant. Differences over time (group x time) was assessed using a repeated measures ANOVA (Figure 2 and Table 3). Statistical significance was set at  $\alpha = 0.05$ . The repeated measures ANOVA showed no significant differences in any one of the three groups. A moderate correlation of -.63 was found between activity level and fear of falling indicating that as activity level decreased, fear of falling increased (Figure 3).

### **Discussion**

The current study hypothesized that there would be a difference in fear of falling between groups of different activity levels. The literature indicates that older women, on average, participate in half the amount of moderate and vigorous activity as young women (Lord et al., 2011). This was reflected by the fact that only three women in this study were classified in the high activity level group (participating in greater than or equal to 300 minutes of physical activity per week). The less active an individual is, the higher the risk of falling, and therefore a higher likelihood that a fear of falling will develop (Bruce et al., 2002). For the current study balance exercises designed to strengthen the ankles and calves were used for the activity portion.

## FEAR OF FALLING IN ELDERLY WOMEN

Because activity level was only monitored prior to the intervention, it is unknown whether or not the current intervention increased activity level. The current study failed to produce any significant improvements in fear of falling across all activity levels. These results indicate that utilizing only balance exercises will not produce a significant change in fear of falling. These results are consistent with the findings that interactive walking programs are the most effective in reducing fear of falling (MacRae et al., 1996; Schoenfelder, 2000).

Education interventions, like the one utilized in this study, have shown mixed results in the reduction of fear of falling. The most effective education programs are those that enhance perceived control over the environment (Cumming et al., 2001). One way in which this study attempted to achieve this was the Home Safety Self-Assessment Tool (HSSAT). The HSSAT is designed to identify potential hazards in the home and provide solutions to help older adults feel in control of their environment and to continue living independently. The main reason for nonadherence to home modification suggestions, however, is older individuals not agreeing that the modifications are necessary (Cumming et al., 2001). This held true for many of the participants in this study. The participants were drawn from a senior living community in which many of the recommended safety modifications had already been put into place. For example, all but one of the participants' apartments, condos, and houses had showers with easily accessible grab bars instead of bathtubs. Participants believed they lived in a safe environment, and therefore were unwilling to attend to modification suggestions. A very common suggestion was to remove area rugs from the home. Only two of the participants believed area rugs posed a threat to their safety and contemplated removing them completely. The other six participants believed the rugs posed no threat to their safety and did not heed the suggestion.

## FEAR OF FALLING IN ELDERLY WOMEN

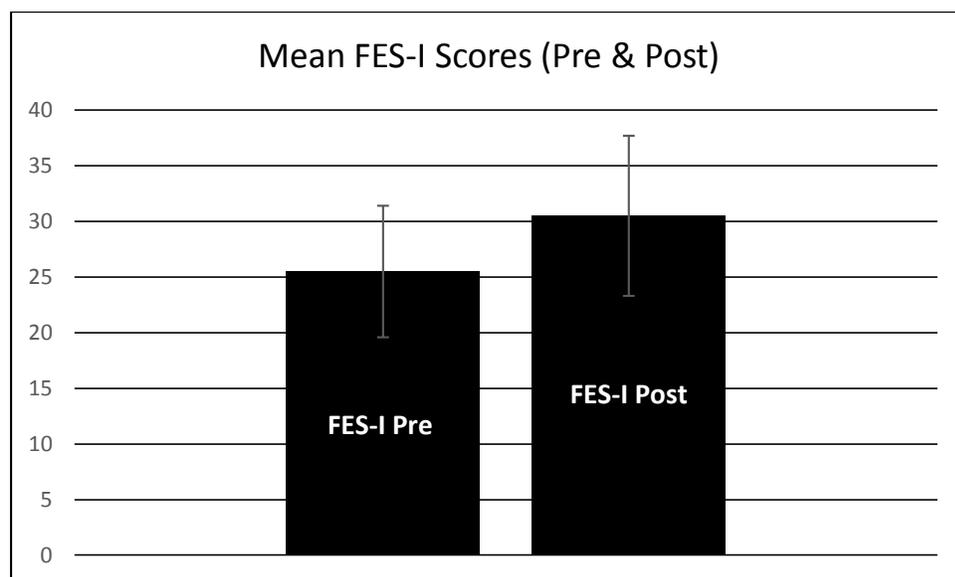
Other aspects of successful education interventions were social interaction and discussion between participants about their fear of falling and environmental hazards (Brouwer et al., 2003; Rucker et al., 2006; Nick et al., 2013; Deery et al., 1999; Legters, 2002). Due to the nature of this study and the one-on-one sessions the women participated in, there was very little communication between participants. It is possible that the materials used in this study would have been more effectively received in a group setting. It is also possible that the scenarios utilized in this study acted as a primer for fear of falling (Neumann & Lozo, 2012). The scenarios detailed the events leading up to and following the falls of four individuals. The post FES-I assessments were given immediately following the education sessions. Although not statistically significant, all three groups had a slight increase in post FES-I scores. The slightly higher scores could be attributed to the fact that each individual had just finished reading the fall scenarios and was therefore more aware of their fear of falling.

Overall, the education intervention utilized in this study that used a variety of materials and techniques was not effective in reducing fear of falling in elderly women. There was no indication that fear of falling was affected by the activity level of the participants. Previous literature has indicated that women of higher activity level experience a lower fear of falling. The results of this study do not support these previous findings. Fear of falling has a complicated etiology with many contributing factors. The results of this study indicate that fear of falling can be independent of activity level. This could indicate that falls self-efficacy is a large factor in the fear of falling. Because these women felt they lived in a safe environment, their perceived control over that environment was high. When perceived control is high, self-confidence (or self-efficacy) in the ability to complete tasks without experiencing a fall will also be high. In different

## FEAR OF FALLING IN ELDERLY WOMEN

settings where individuals have less control over the environment, the results may have been more consistent with the previous literature.

### Tables and Figures



*Figure 1.* Mean values for pre and post FES-I scores. Standard deviation is indicated with an error bar attached to each column.

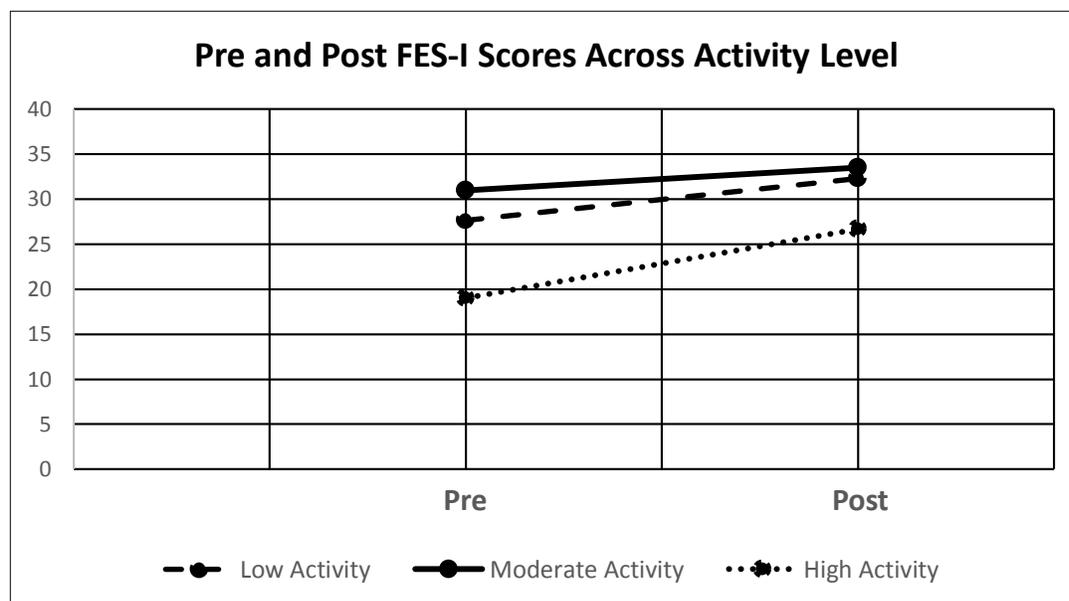
Table 2.

#### FES-I Scores

Pre	Post	N	Mean Difference	P-Value
25.5(5.9)	30.5(7.2)	8	-1.9	.58

*Note:* ( ) = SD

## FEAR OF FALLING IN ELDERLY WOMEN



*Figure 2.* Values for pre and post FES-I scores compared across low, moderate, and high activity levels. FES-I scores range from 16 to 64 with 16 indicating the lowest fear of falling and 64 indicating the highest.

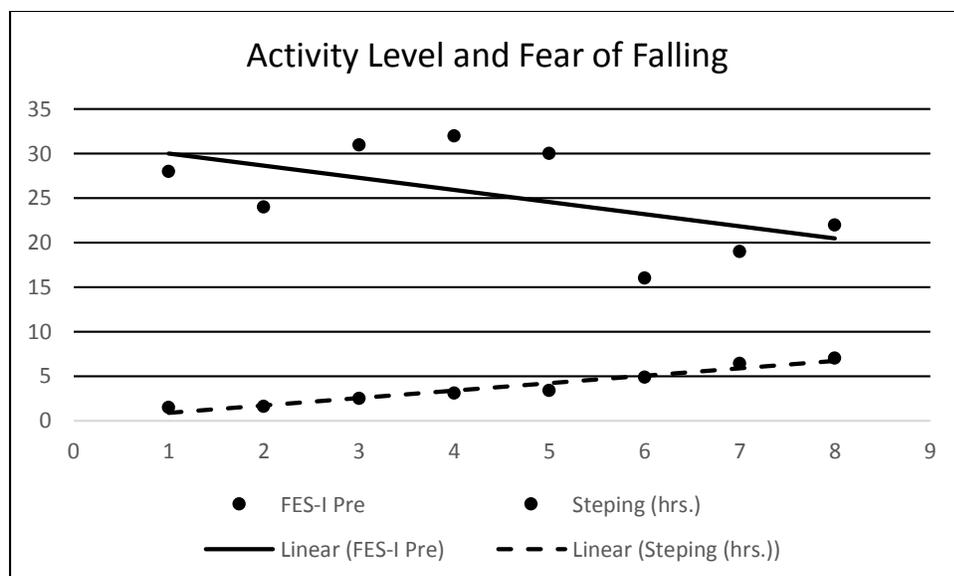
Table 3.

## ANOVA

	Low Activity (n = 3)		Moderate Activity (n = 2)		High Activity (n = 3)	
	Pre	Post	Pre	Post	Pre	Post
FES-I Mean	27.7(3.5)	32.3(8.1)	31.0(1.4)	33.5(6.4)	19.0(3.0)	26.7(7.6)

*Note:* ( ) = SD

## FEAR OF FALLING IN ELDERLY WOMEN



*Figure 3.* Moderate correlation (-.63) between activity level and fear of falling.

## FEAR OF FALLING IN ELDERLY WOMEN

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## FEAR OF FALLING IN ELDERLY WOMEN

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