



7-1-2014

## The Impact of Fear of Falling on Functional Independence Among Older Adults Receiving Home Health Services

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### Recommended Citation

Lawson, K. A., & Gonzalez, E. C. (2014). The Impact of Fear of Falling on Functional Independence Among Older Adults Receiving Home Health Services. *The Open Journal of Occupational Therapy*, 2(3). <https://doi.org/10.15453/2168-6408.1093>

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# The Impact of Fear of Falling on Functional Independence Among Older Adults Receiving Home Health Services

## Abstract

**Background:** Falls are the fifth leading cause of death for adults aged 65 years and older. Several intrinsic and extrinsic fall risk factors have been identified, but there is less understanding of the impact of a fear of falling on falls. Seventy percent of recent fallers and 40% percent of non-fallers report a fear of falling. Therefore, the purpose of this study was to examine the correlation between a fear of falling and a history of falls, as well as the impact on the functional independence of community-dwelling older adults receiving home health services.

**Methods:** The participants completed the Falls Efficacy Scale, the Modified Timed Up and Go Test, self-reported fear of falling, and the KATZ ADL-staircase. The participants were primarily Hispanic females.

**Results:** There was not a significant correlation between a fear of falling and a history of falls. Only participants' age, gender, and the number of medical diagnoses were predictive of past falls. There was a moderate correlation between impaired functional mobility and dependence with activities of daily living (ADL). Additionally, a fear of falling was associated with dependence to perform ADLs as measured objectively.

**Conclusion:** Future studies need to examine the effectiveness of interventions that include dual-task challenges during therapeutic interventions and ADL retraining to reduce fall risk among older adults.

## Comments

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## Keywords

fear of falling, ADL, community-dwelling older adults, fall risk, and recurrent fall

## Credentials Display

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DOI: 10.15453/2168-6408.1093

In the United States each year, one in every three adults aged 65 years and older suffers a fall, 46% of which result in a fatality due to complications (Centers for Disease Control and Prevention [CDC], 2006). Therefore, reducing fatal falls among older adults is one of the nation's health objectives (U.S. Department of Health and Human Services [HHS], 2013). Interventions targeting specific domains or specific fall risk factors, however, have had limited success in reducing the incidence of falls (Chang et al., 2004; Leland, Elliott, O'Malley, & Murphy, 2012). Because several fall risk factors have been identified for community-dwelling older adults, it is difficult to target a single risk factor for intervention (Ambrose, Paul, & Hausdorff, 2013; Cesari et al., 2002). Additionally, older adults typically present with several fall risk factors at once (Cesari et al., 2002; Deandrea et al., 2010). The literature identifies two types of fall risk factors: personal (intrinsic) factors, such as age, gender, muscle weakness, and poor balance (Cesari et al., 2002), and environmental (extrinsic) factors, such as poor lighting or loose rugs in the home (Ambrose et al., 2013; Cesari et al., 2002). Another risk factor more recently under study is the subjective experience called *fear of falling* (Ambrose et al., 2013; Cesari et al., 2002).

A history of recurrent falls and/or the severity of a fall can foretell a fear of falling (Orellano, Colón, & Arbesman, 2012). However, older adults who have experienced a non-injurious fall or who have never fallen also report a fear of falling (Hotchkiss et al., 2004). Researchers have hypothesized that a fear of falling leads to a restriction of activity in the home and in the

community (Hotchkiss et al., 2004; Schepens, Sen, Painter, & Murphy, 2012). Although the desire to avoid further falls leads to a restriction of activity, it also sets in motion a loss of independence resulting from decreased strength, balance, and endurance, which further increases the risk of falling (Petrella, Payne, Myers, Overend, & Chesworth, 2000).

For example, from a study of 82 community-dwelling older adults, Allison, Painter, Emory, Whitehurst, and Raby (2013) concluded that a fear of falling was significantly correlated with objective measures of balance. For their participants, however, impairments with balance and functional mobility (as measured with the Timed Up and Go Test) were associated with activity restriction more so than with a fear of falling. Therefore, a fear of falling may only indirectly influence activity restriction through its impact on balance and functional mobility. It is important to note that Allison et al. (2013) used an objective measure of balance and functional mobility but used a self-report measure of activity restriction.

Other researchers have also reported an association between impaired balance and functional mobility and recurrent falls for community-dwelling older adults (Shumway-Cook, Brauer, & Woollacott, 2000). Functional mobility is a component of most daily activities, including bathing, dressing, toileting, preparing meals, and cleaning house (Bolding, Adler, Tipton-Burton, Verran, & Lillie, 2013; James, 2009). These periods of transition or functional mobility pose challenges to posture and balance that could result in a fall. Therefore, it stands to reason that reduced

participation in activities of daily living (ADL), both in and out of the home, may result from challenges with balance and functional mobility (Gill, Allore, Hardy, & Guo, 2006).

Although evidence indicates an association between functional independence and the risk of falling for older adults, there is little evidence regarding fall risk factors for community-dwelling older adults who receive home health care (Lewis, Moutoux, Slaughter, & Bailey, 2004). Persons receiving home health care are often older, sicker, and frailer than the average community-dwelling older adult. As a result, it may be necessary to tailor fall prevention strategies and interventions developed for community-dwelling older adults to incorporate the complexity of the home health patient's diagnosis, comorbidities, or overall health status (Lewis et al., 2004). This study aimed to address this gap in the literature by investigating the relationship among a fear of falling, a history of falls, functional independence, balance, and functional mobility among older adults receiving home health care. Specifically, the researchers wanted to examine whether or not there is a correlation between a fear of falling and a history of falls and reduced participation in ADL for this population.

## **Methods**

### **Study Design**

This was a correlational study using a convenience sample of home health patients recruited from two agencies to determine if there was an association among a fear of falling, a history of falls, and functional independence for a sample of older adults. Researchers collected data via a

retrospective chart review, participant interviews, and objective assessment of the participants' current functional status. Patient evaluations and interviews took place during a scheduled home visit.

### **Participants**

Participant selection was from a pool of home health patients residing in a Texas/Mexico border community. The researchers trained case managers (registered nurses) working for two home health agencies to complete prestudy screenings to ensure patients met the criteria to participate in all phases of the research project. Home health patients were eligible to participate if they were aged 65 years or older and ambulatory (able to walk independently with or without an assistive device). They also needed to have no significant problems with cognitive functioning as assessed by the case managers using the Outcome and Assessment Information Set (OASIS). Any impairment noted on the Neuro/Emotional/Behavioral Status section of the OASIS excluded a patient from participation [M1700, M1710, M1740, and M1745] (Centers for Medicare & Medicaid Services, 2009). Additionally, a confirmed medical diagnosis of dementia or other cognitive limitations automatically excluded a patient from the study, as the researchers deemed these patients as unable to understand the procedures, risks, and benefits of the study before signing the consent forms. The patients were informed that their participation in the study would not affect their status with the home health agency. The institutional review board of the University of Texas at El Paso approved all procedures for this study. The sample size was

determined by conducting a power analysis using G\*Power (Erdfeider, Faul, Buchner, & Lang, 2009). A sample size of at least 90 was needed based on a 7-predictor variable equation that was used as a baseline.

## Materials

**Medical records.** The participants' home health medical records were used to confirm the data collected during the participant interviews. The researchers collected basic demographic information to describe the sample, including age, gender, ethnicity, insurance, and the reason for referral to home health. Additional information accessed from the medical record included the number of falls reported, the number of medical diagnoses, and the number of prescribed medications. The fall risk factors derived from the medical records (age, gender, the number of falls reported, the number of medical diagnoses, and the number of prescribed medications) were entered into the regression analysis. Written consent from all of the participants granted access to their medical records.

**Falls Efficacy Scale (FES).** The researchers used the FES to measure the participants' fear of falling (Tinetti, Richman, & Powell, 1990). The FES is a 10-item self-report tool developed to measure the fear of falling when performing daily tasks (Tinetti, Mendes de Leon, Doucette, & Baker, 1994). The FES allows researchers to determine a participant's self-efficacy, or his or her ability to perform an activity without a fear of falling. Self-efficacy, as used in this scale, is the person's perceived ability to perform an activity without losing one's balance

(Bandura, 1977). The participants are asked to rate their self-efficacy while performing 10 daily tasks: taking a bath or shower, reaching into cabinets or closets, walking around the house, preparing meals (not requiring carrying heavy or hot objects), getting in and out of bed, answering the door or telephone, getting in and out of a chair, getting dressed and undressed, grooming, and getting on and off the toilet. Responses can range from 1 (very confident) to 10 (not confident at all), with 100 representing the highest possible score and the maximal fear of falling. Participants' responses are added and a score of 70 or above indicates the respondent has a fear of falling (Huang & Wang, 2009). This is rated as a negative indicator due to low confidence. Criterion validity has been reported to be good as determined by correlation of FES scores to two other measures of confidence to maintain one's balance while performing ADL: Activities-Specific Balance Confidence (ABC) and Geriatric Fear of Falling Measurement (GFFM) (Huang & Wang, 2009). Internal consistency has also been reported to be high (Cronbach's alpha = 0.98). The scale is available in English and Spanish.

Studies examining the effect of a fear of falling have made extensive use of the FES (Yardley et al., 2005; Delbaere et al., 2010). Reports show that the FES is highly correlated to a self-reported ability to perform physical ADL (P-ADL) and instrumental ADL (I-ADL). FES scores are also reported to be moderately associated with a level of social activity. Additionally, in prospective studies of older adults, participants who reported higher FES scores at baseline demonstrated a

greater decline in self-reported ADL status, a greater deterioration of health-related quality of life, and a greater risk for falling (Cumming, Salkeld, Thomas, & Szonyi, 2000).

**Fear of falling.** The researchers also employed a 3-item survey developed for this study to assess the participants' fear of falling. Two items assessed participants' perceived susceptibility of falling and their perceived severity of future falls. A third item asked the participants "are you afraid of falling," rather than asking about their confidence with performing ADL tasks without falling.

**KATZ ADL-staircase.** Functional independence was measured using the KATZ ADL-staircase. The KATZ is a 10-item tool used to assess the following ADLs: feeding, toileting, dressing, grooming, bathing, cooking, shopping, cleaning, and functional transfers and transportation. The ADL-staircase was based on the KATZ ADL-index (Katz, Ford, Moskowitz, Jackson, & Jaffe, 1963). The original version of the KATZ included a transportation item that was specific to transportation in urban areas (Sonn & Åsberg, 1991). The revised version includes an alternative item that is specific to transportation in rural areas (Iwarsson, 1998; Iwarsson & Isacson, 1997).

Direct observations of assessed activities as well as participant interviews determined the scores on the KATZ ADL-staircase. The type and number of activities that the participant was able to complete independently determined the total score. Scores ranged from 1 (independent in all activities) to 7 (dependent in all activities). Reliability of the KATZ ADL-staircase is reported to be greater if the

observers have training in assessing functional abilities of clinical populations. The KATZ ADL-staircase has been used extensively to evaluate ADLs and is a reliable measure of this outcome (Iwarsson, 1998; Iwarsson & Isacson, 1997; Jakobsson, 2008; Rolland et al., 2007; Santana-Sosa, Barriopedro, Lopez-Mojares, Perez, & Lucia, 2008).

**Number of falls.** The researchers asked the participants to report the number of falls they had experienced over the past three months. In the context of this study a fall was defined as an unexpected event in which a person comes to rest on the ground, floor, or at a lower level. The responses to the following questions determined the number of falls: "During the past three months, how many times have you fallen and landed on the floor or ground?" The number of falls reported by the participants was compared to the number of falls reported to the nurse during the intake interview for home health services (OASIS). In cases where there was a discrepancy, the researchers contacted the participants again and asked probing questions to determine that the participant understood what was meant by a fall. The number of falls reported after clarification was the number recorded for that participant. For statistical analyses, the participants were categorized as a non-faller if they reported 0-1 falls and as a recurrent faller if they reported two or more falls (Stel et al., 2003).

**Modified Timed Up and Go Test (TUG).** Functional mobility was measured using the TUG. The TUG is a test of gait speed under three conditions. In the first condition (TUG), the participants stand from a chair, walk three meters,

turn around (180°), walk back to the chair, and sit back down. In the second condition (TUG manual), the participants complete the same task but while carrying a full cup of water. In the third condition (TUG cognitive), the participants complete the original walking task while counting backwards from 100. The participants may use walking aides as customary.

The TUG is used extensively to test functional ability and has excellent criterion validity and test-retest reliability ( $r = .97$ ; Podsiadlo & Richardson, 1991; American College of Rheumatology, 2008; Kratz, Schepens, & Murphy, 2013). The TUG is reported to have moderate to high correlations to other measures of balance and function: Berg Balance Scale ( $r = -.81$ ), gait speed ( $-.61$ ), and the Barthel Index of Activities of Daily Living ( $r = -.78$ ) (Podsiadlo & Richardson, 1991).

Specific norms have not been established for the three TUG conditions, although several authors have established thresholds based on clinical studies. Arnold and Faulkner (2007) established that a TUG score of greater than 10 s is predictive of a near fall in older adults with hip osteoarthritis (odds ratio 3.1, 95% confidence intervals 1.0-9.9) (Arnold & Faulkner, 2007). Using logistic regression, Podsiadlo and Richardson (1991) established the sensitivity of the TUG to predict a fall using a cutoff score of greater than or equal to 13.5 s at 0.80, with a specificity of 1.004. More recently, a study comparing TUG scores of community-dwelling and institutionalized women aged 65 to 85 years recommended that scores greater than 12 be used as indicative of impaired mobility requiring further assessment and possible

interventions (Bischoff et al., 2003). Shumway-Cook et al. (2000) also conducted a study of community-dwelling older adults using the TUG; however, they examined the sensitivity and specificity of the TUG to predict the probability of falls among this population. The cutoff scores and overall prediction (sensitivity and specificity) for the three TUG conditions were reported as follows: TUG alone  $\geq 13.5$  s (90%), TUG manual  $\geq 14.5$  s (90%), and TUG cognitive  $\geq 15$  s (86.7%) (Shumway-Cook et al., 2000). The current study used the following thresholds for TUG scores: TUG alone  $\geq 13.5$  s, TUG manual  $\geq 14.5$  s, and TUG-cognitive  $\geq 15$  s.

### Procedures

The researchers recruited the participants in this study from two home health agencies where the participants were homebound. Once the home health agencies identified patients as eligible for the study they were contacted with an explanation of the study and asked to sign consent forms. A 2 hr assessment at each participants' convenience was scheduled to complete the study. All assessments for this study were completed in the participant's home by a certified occupational therapist. Data collection occurred from June to September of 2012.

The order of the performance measures remained constant for all of the participants to keep the physical and cognitive demand equal (FES, TUG, and the KATZ ADL-staircase). Additionally, the order was kept constant to reduce a threat to validity resulting from order effects. The participants donned a gait belt during all performance assessments to ensure patient safety. The walking course for the TUG test was laid out

using bright pink duct tape to designate placement of the chair and the turnaround point. The same Casio stopwatch was used to time all of the participants' performances. The participants completed the TUG alone once prior to recording their performance on the three TUG conditions to ensure they understood the instructions. The participants used a cane or walker if it was customary for them to use a walking aide. None of the participants in this study reported using a walking aide. All instructions were scripted and rehearsed in English and Spanish prior to the start of the study.

### Statistical Analyses

Statistical analyses were conducted using IBM SPSS Statistics version 20 (IBM Software). The correlation analyses were conducted with the participants classified in categories as follows:

Falls: *non-faller*  $\leq 1$  fall; *recurrent faller*  $\geq 2$  falls.

Functional mobility: *impaired* = TUG alone  $\geq 13.5$  s; TUG manual  $\geq 14.5$  s; TUG cognitive  $\geq 15$  s

Functional independence (KATZ ADL): *independent* = total score  $\leq 2$ ; *dependent* = total score  $\geq 3$ .

Regression analyses were used to examine the extent that a fear of falling was associated with ADL functioning and with a history of falls relative to other known fall risk factors. Variables entered into the regression analyses were the FES, the reported fear of falling, age, gender, the number of prescribed medications, the number of medical

diagnoses, the KATZ ADL, and the number of falls. For the regression analyses, the number of falls were categorized into four groups: group 1 = 0-1 falls, group 2 = 2-4 falls, group 3 = 5-7 falls, and group 4 = greater  $\geq 8$  falls.

### Results

From an initial pool of 105 eligible home health patients, researchers enrolled 99 in the study. Six patients were excluded because they were wheelchair bound and therefore unable to perform the required tasks. The participants were primarily female (66.7%), Hispanic (65.7%), and over the age of 75 ( $\bar{X} = 78.62$ ,  $SD = 7.9$ ). See Table 1 for a summary of the participants' characteristics.

**Table 1**  
*Participant Characteristics*

Variable	
Age, mean (SD)	78.6 (7.9)
Gender, n (%)	
Male	33 (33.3)
Female	66 (66.7)
Falls reported in past 3 months, n (SD)	2.8 (1.8)
Number of diagnoses, n (SD)	5.1 (2.3)
Number of medications, n (SD)	8.3 (4.7)
Reason for referral, n (%)	
Fall episode	7 (7.1)
Acute health episode	66 (66.7)
Post-op recovery	26 (26.3)
Ethnicity, n (%)	
Hispanic	65 (65.7)
White	23 (23.2)
Other	11 (11.1)
Insurance, n (%)	
Medicare	71 (71.7)
Medicaid	28 (28.2)
Uninsured	0 (0)

Note. SD = standard deviation.

The number of falls reported by the participants for the past three months ranged from 0 to 12 ( $\bar{X} = 2.78$ ;  $SD = 1.83$ ). The majority of these participants reported at least one fall in the last three months (96%) and most could be classified as recurrent fallers (81.8%). There was no statistically significant difference in the number of falls reported

by these participants based on gender ( $t = .97$ ,  $p = .335$ ).

Approximately one-fourth of the participants (26.3%) were independent with all ADLs. A larger number of the participants were dependent in all but one ADL category (31.3%). See Table 2 for the descriptive information specific to scores on the KATZ ADL-staircase.

**Table 2**

*Distribution of Participants by Performance Scores on the KATZ ADL-staircase*

Score	Criteria	Frequency	Percent	Functional Category
1	Independent with all ADLs	26	26.3%	Not Impaired
2	Independent with all except one ADL	4	4.0%	Not Impaired
3	Independent with all except bathing, plus one ADL	11	11.1%	Impaired
4	Independent with all except bathing, dressing, plus one ADL	15	15.2%	Impaired
5	Independent with all except bathing, dressing, toileting, plus one ADL	9	9.1%	Impaired
6	Independent with all except bathing, dressing, toileting, transfers, plus one ADL	31	31.3%	Impaired
7	Dependent with all ADLs	3	3.0%	Impaired
Total		99	100%	

*Note.* ADLs = activities of daily living.

The participants' functional mobility was not correlated to their reported history of falls. Pearson correlations were calculated first using the number of seconds on the TUG for the three conditions and the total number of falls reported: TUG alone ( $r = .059$ ,  $p = .565$ ), TUG manual ( $r = .080$ ,  $p = .431$ ), and TUG cognitive ( $r = .097$ ,  $p = .339$ ). Spearman's rho statistic was also used to analyze data with the participants categorized as non-fallers and recurrent fallers and their functional mobility categorized as impaired or not impaired based on the Shumway-Cook et al (2000) criteria reported previously: TUG alone (Spearman's  $r =$

$.005$ ,  $p = .962$ ), TUG manual (Spearman's  $r = .057$ ,  $p = .574$ ), and TUG cognitive (Spearman's  $r = .088$ ,  $p = .388$ ).

A chi-square analysis was significant when comparing differences between the observed and the expected outcome of individuals demonstrating functional impairment when walking while counting backwards but not significant for the difference when walking while carrying a filled cup. The frequency of expected impairment in functional mobility was taken from results of the study population's performance on the TUG while just walking. See Table 3 for the number of participants

in each category of the TUG subtests with results of the chi-square analysis.

Correlations were low to moderate and in the expected direction; a slower speed to complete

all TUG conditions was associated with greater dependence to complete ADLs as measured with the KATZ ADL-staircase. See Table 4 for correlations and significance levels.

**Table 3**  
*TUG Scores by Category and Chi-Square Analysis ( $\chi^2$ )*

TUG subtest	Range	Mean (SD)	Not Impaired	Impaired	Total	$\chi^2$ Analysis
TUG alone	4-28 s	12.32 (6.29)	60	39	N = 99	$df = 1$ $\alpha = .001$
TUG manual	5-35 s	15.98 (7.32)	49	50	N = 99	$\chi^2$ crit.= 10.83 $\chi^2$ obs.= 5.12 5.12<10.83
TUG cognitive	7-47 s	20.70 (8.73)	25	74	N = 99	$\chi^2$ crit.= 10.83 $\chi^2$ obs.= 51.83 51.83>10.83

Note. TUG = Timed Up & Go Test; (SD) = standard Deviation; N = number of participants.

**Table 4**  
*Correlations of TUG Category to Performance of KATZ ADL-staircase*

TUG subtests	TUG alone	TUG manual	TUG cognitive
KATZ	$r = .31$ ( $p = .001$ )	$r = .39$ ( $p = .000$ )	$r = .44$ ( $p = .000$ )

Note. TUG = Timed Up & Go Test; KATZ = KATZ ADL-staircase.

A regression analysis was conducted to determine if a fear of falling was predictive of functional independence (KATZ ADL-staircase). Variables entered into the regression were gender, insurance (proxy for socioeconomic status), FES, subjective reported fear of falling, the number of prescribed medications, age, and the number of medical diagnoses. Variables that entered into the final model that predicted functional independence were the FES, subjective reported fear of falling,

age, and the number of prescribed medications [ $F = 20.70$  (4, 94),  $p = .0001$ ,  $R^2 = .47$ ].

A regression analysis was also used to examine if a fear of falling contributed to the prediction of a history of falls beyond that of other known fall risk factors. Variables entered into the regression were gender, insurance (proxy for socioeconomic status), the FES, subjective reported fear of falling, the number of prescribed medications, age, and the number of medical diagnoses (see Table 5). Ninety-nine cases were

entered into the analysis. All requested variables were entered into the regression model. In the second model, only the number of diagnoses and gender contributed to the prediction of falls reported over the past three months [ $F = 11.3$  (2, 96),  $p = .001$ ,  $R^2 = .19$ ]. The size and direction of the relationship suggested that females who reported a

greater number of medical diagnoses also reported a greater number of falls. The model accounted for 19% of the variance in the number of falls reported as predicted by the number of medical diagnoses and gender. However, the addition of gender only slightly increased  $R^2$  to improve the prediction of the number of falls reported from .15 to .19.

**Table 5**

*Effect of Secondary Variables on Fear of Falling*

Variable	Regression Co-efficient	p-value
Falls	0.15	NS
Gender	-0.17	NS
Age	0.24	0.05
FES	0.09	NS
Dx	0.29	0.01
Meds	-0.03	NS

*Note.* NS = not statistically significant; FES = Falls Efficacy Scale; Dx = diagnosis; Meds = number of medications.

An exploratory path analysis was conducted to explain the interrelationship of the variables entered into each of the regression analyses. The number of medications, the number of medical diagnoses, and gender, but not a fear of falling, were found to be correlated to the frequency of falls. Therefore, a fear of falling was not shown to be a contributing factor to the frequency of falls.

A chi-square analysis was conducted to determine if there were gender differences for the number of falls and reported fear of falling. Women reported more falls than men. However, this difference was not significant [ $X^2 = 3.1$ ,  $p = .38$ ]. Women were also more likely than men to report having a fear of falling and this difference was significant [ $X^2 = 13.33$ ,  $p = .001$ ]. It should be noted that the questions about perceived

susceptibility and perceived severity were asked of each participant whether they responded yes or no to a self-reported fear of falling. However, only those participants who reported a fear of falling also reported that they perceived they were susceptible to a future fall and that an additional fall would be severe.

### Discussion

The main objective of the study was to examine the association between a fear of falling and ADLs, specifically for community-dwelling older adults receiving home health services. Whereas previous researchers have identified specific risk factors for falls among older adults (Feuring, Vered, Kushnir, Jette, & Melzer, 2013), studies identified in this area were primarily based on a self-reported level of function rather than on an

objective measure of functional performance. The current study is unique in that the participants were observed performing their P-ADLs and I-ADLs in their homes. Additional questions allowed the researchers to understand the impact of a fear of falling for the participants in the present study; specifically, self-efficacy, perceived susceptibility, and perceived severity.

The impetus for this study was the high number of emergent care visits due to falls reported for patients receiving skilled home health services (Centers for Medicare & Medicaid Services, 2014). Impaired functional mobility and decreased participation in ADLs have been associated with an increased risk of falling (Deandrea et al., 2010). The participants in the present study demonstrated impaired functional mobility (slower walking speeds) in both dual-task situations (TUG manual and TUG cognitive). The participants demonstrated the greatest impairment with mobility when the dual-task challenge was cognitive in nature. This is consistent with findings reported for older participants in other studies using a dual-task paradigm (Faulkner et al., 2007; Shumway-Cook et al., 2000). However, unlike other studies reported in the literature, impaired functional mobility, as measured with the TUG, was not significantly correlated with a history of recurrent falls for the participants in this study. This may have been the result of having a high number of participants who reported two or more falls and who also demonstrated impaired functional mobility. Therefore, for our participants there was not a correlation between impaired functional mobility and falls but there was a positive correlation

between impaired functional mobility and impaired functional independence.

The participants who reported they had a fear of falling did not necessarily report low levels of confidence on the FES (self-efficacy). However, the participants who answered yes to the direct question “are you afraid of falling?” also reported they perceived they were susceptible to future falls and that they perceived future falls would be more severe (78 out of 99 participants). Therefore, perceived self-efficacy (FES) did not seem to be directly related to one’s reported subjective fear of falling. From previous research, aging has been associated with decreased independence with performing P-ADLs and I-ADLs which has also been associated with lower levels of self-efficacy for performing these tasks and activities without falling (Bertera & Bertera, 2008; Cumming et al., 2000). This study supports these findings to the extent that a fear of falling (as measured with the FES and the direct question “do you have a fear of falling”) was correlated to age, gender, decreased functional independence, and decreased functional mobility.

For the participants in the present study there was a moderate and positive correlation between impaired functional mobility and decreased independence with ADLs as measured with the KATZ ADL-staircase. The correlations were all positive but the highest was between the TUG cognitive condition and KATZ scores. Although cognitive deficits have been clearly linked to impaired functional mobility (Kearney, Harwood, Gladman, Lincoln, & Masud, 2013) and dual-task demands have been linked to impaired functional

mobility (Faulkner et al., 2007; Shumway-Cook et al., 2000), it is not clear whether dual tasks that increase cognitive demand are associated with impaired functional independence for community-dwelling older adults.

Although the researchers did not use an extensive cognitive battery to evaluate these participants, they excluded patients with a confirmed diagnosis of Alzheimer's or other cognitive impairment from participating in the present study. Additionally, the screening process included questions to ensure that potential participants were oriented to person, place, and time before being asked for informed consent. This increased our confidence in concluding that the positive association between the TUG cognitive condition and a greater dependence to complete ADLs was not the result of age-related changes in one's ability to attend in dual-task situations as reported previously for this population (Hofheinz & Schusterschitz, 2010; Nagamatsu, Kam, Liu-Ambrose, Chan, & Handy, 2013; O'Halloran et al., 2011). Therefore, these results suggest that for older adults, therapy needs to include a "just right" challenge of practicing ADLs with a dual task requiring cognitive attention to decrease the risk of activity restriction that has been previously linked to an increased risk of falling. Future studies need to look at the efficacy of treatment models that incorporate dual-task cognitive demands while practicing functional activities and functional mobility in the home and in the community.

Fiona et al. (2013) recently conducted a systematic review of studies that examined the relationship between executive function, gait

abnormalities, and falls among older adults. From the 14 prospective studies included in their review, they found that poor executive function was related to more serious falls. Additionally, poor executive function was associated with declines in gait speed in three of the studies included in their review. The question remains, are these declines in gait speed associated with increased cognitive demands also associated with decreased independence to perform ADLs?

Despite the existence of numerous studies supporting the effectiveness of fall-prevention interventions for community-dwelling adults aged 65 years and older (Gillespie et al., 2009; Tinetti, Baker et al., 1994; Hogan et al., 2001), knowledge of fall prevention in home health care is limited. Evidence suggests that community-dwelling older adults who receive individualized home programs of muscle strengthening and balance retraining; complex multidisciplinary, multifactorial, health or environmental risk factor screening and intervention; home hazard assessment and modification; and medication review and adjustment can all reduce the incidence of falls (Gillespie et al., 2009). However, patients in home health care are often older, sicker, and frailer than the average community-residing older adult. The current literature regarding studies specific to home health care reveal primarily retrospective, descriptive, correlational designs in single agencies. These studies used matched control or randomized control groups to explore patient characteristics and other factors that contributed to patient falls (Isberner et al., 1998; Lewis et al., 2004; Sheeran, Brown, Nassisi, & Bruce, 2004). The findings from

these studies propose that risk factors for falls among home health patients are a previous fall event, a primary diagnosis of depression or anhedonia, the use of antipsychotic phenothiazine's and tricyclic antidepressants, a secondary diagnosis of neurological or cardiovascular disorders, balance problems, frailty, and an absence of handrails (Isberner et al., 1998; Lewis et al., 2004; Sheeran et al., 2004).

Three studies have tested fall intervention programs for home health patients (Bright, 2005; Yuan & Kelly, 2006; Sperling, Neal, Hales, Adams, & Frey, 2005). Each study was conducted on a single as a quality improvement initiative. The studies proposed that thorough screening for fall risk factors using valid and reliable instruments in addition to interventions focused on gait and balance deficits may reduce injury and emergent care visits. However, there was no evidence that the number of falls experienced by patients in the home health setting could be reduced. The patients receiving skilled home health care services were chosen for this study since emergent care for injury caused by falls or accidents at home are one of the most frequently occurring adverse events reported for this population (Centers for Medicare & Medicaid Services, 2014).

### **Study Limitations**

This study has several limitations. The recruiting strategy may have influenced the lack of association between walking speed, dual-task demands, and a history of falls. The participants were living in the community but were receiving skilled home health services. Therefore, they may not be representative of a general population of

adults aged 65 years and older. However, as stated previously, patients receiving skilled home health care services were chosen for this study because emergent care for injury caused by falls or accidents at home are one of the most frequently occurring adverse events reported for community-dwelling adults aged 65 years and older (Centers for Medicare & Medicaid Services, 2014).

Additionally, most of the participants in this study reported two or more falls. Therefore, the sample was disproportionately represented in the recurrent-faller category versus the non-faller category. Despite the frequency of falls reported in this study, only 4% of the sample had been referred for health services after a fall.

Another possible confounding factor in this study was that the participants may have demonstrated greater independence when performing ADLs during the assessment than on a typical day. The observations were completed by a certified occupational therapist who used a gait belt during all observations, thereby possibly increasing the participants' confidence to complete the required tasks. Thirty percent of the participants were classified as not impaired with ADLs and only 3% were impaired with all ADLs. However, it seems that if the therapist being present during task performance improved ADL function, the correlations that resulted would have been lower or none existent. To our knowledge, this is the first study of functional independence and dual-task demands based on direct observation of performance rather than on a self-reported level of function.

It is also possible that the results of the present study were attenuated as a result of how falls are conceptualized and reported by the participants. The researcher clearly defined falls when asking the participants about the number of falls experienced. However, the participants may not have known to count an event as a fall if there was no physical injury, fracture, or hospitalization. Anecdotally, during several home visits, care providers who were present were surprised that the participants had not previously disclosed the fall to them. We can only speculate that the participants may not disclose previous fall events to others to avoid worrying family members or to avoid being judged as incapable of independent function.

#### **Implications for Occupational Therapy Practice**

Due to the high number of deaths among older adults as a result of falls, the CDC has made it a priority to challenge medical disciplines to implement fall intervention programs with documented effectiveness (HHS, 2013). This challenge is especially relevant to the field of

occupational therapy because the discipline strives to influence occupational performance throughout a person's lifespan. The older adults in this study, whose health was already compromised, were observed while performing ADLs within their home environments. Specific barriers to independent function were identified during the process of performing ADL tasks and it is these barriers that occupational therapists need to address when designing intervention programs. Although numerous individual and environmental fall risk factors have been identified in the literature, targeting single skills to prevent falls has not been shown to be effective in fall prevention. Results of the present study would indicate that interventions need to address multi-body functions (cognitive, sensory, neuromusculoskeletal, behavioral, and cardiovascular) (World Health Organization, 2001) as required to complete functional activities, rather than practicing a specific skill, such as balance (American Occupational Therapy Association, 2008).

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