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# FEAR OF FALLING ASSESSMENT AND INTERVENTIONS IN COMMUNITY-DWELLING OLDER ADULTS: A MIXED METHODS CASE STUDY

by

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A thesis submitted in partial fulfillment of the requirements
for the Honors in the Major Program
in the College of Nursing
and in the Burnett Honors College
at the University of Central Florida
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## Abstract

**Background:** Fear of falling has significant adverse physical and psychological effects for the community-dwelling older adult. **Objective:** The purpose of this study was to assess fear of falling in community-dwelling older adults and explore participant perceptions of fear of falling assessments and interventions. **Methods:** A mixed methods case study was utilized to gain an in-depth understanding of older adults' perceptions. It consisted of quantitative data collection by objective measures and qualitative data collection by four individual in-depth interviews. A sample of four community-dwelling adults aged 65 years and older and living in Orlando, Florida, completed the study in their home environment. To combine quantitative and qualitative data for each participant, a case-specific analysis was used, resulting in narratives with a storytelling approach aiming to explore each participant independently. This was followed by a cross-case analysis to gain a more comprehensive understanding of the participants in relation to one another. **Results:** Four themes emerged: 1) Feedback from an objective measure is valuable; 2) Family experiences with fear of falling drive personal interventions; 3) Fundamental assessments for fear of falling are missing, and 4) Fluctuating definitions of "fear" contribute to difficulty in assessments and interventions. **Conclusion:** Clear perceptual themes developed to provide a comprehensive understanding of community-dwelling older adults' perceptions of fear of falling assessments and interventions. Future research is needed to determine how to best combine feedback-oriented assessments with established interventions, such as exercise. Standardization of a subjective measure for fear of falling to use in combination with objective measures is also needed.

**Keywords**: assessment, intervention, fear of falling, older adults, community-dwelling, mixed methods

# Dedication

To my family and friends, any success I have had in this past year is equally yours.

I cannot thank you enough.

## Acknowledgments

Dr. Thiamwong, thank you for sharing your passion and expertise for the aging population. I have benefitted from and admired your intelligence, creativity, compassion, and advocacy.

Thank you also, to Dr. Loerzel for your guidance and support during the creation of this thesis.

## Table of Contents

# Introduction

Falls are a significant public health concern in the older adult population, notably, because the number of fall-related deaths increased by 30% from 2007 through 2016 (Center for Disease Control and Prevention, 2017). Further, unintentional falls were the number one cause of accidental injury deaths in adults aged 65 and older (Nation Center for Injury Control and Prevention, 2017).

Falls not only have physical consequences for older adults, but they also have psychological effects, one of which is the development of fear of falling. According to a systematic review conducted by Scheffer, Schuurmans, van Dijk, van der Hooft, and de Rooij (2008), the prevalence of fear of falling among community-dwelling older adults range from 3% - 85%. The lack of uniformity in defining and measuring fear of falling may contribute to this wide range (Jung, 2008). It is not uncommon for this phenomenon to develop after a fall has occurred (Dingová & Králová, 2017; Lavedán et al., 2018) but may also develop in older adults who have never experienced a fall before (Friedman, Munoz, West, Rubin, & Fried, 2002; Lach, 2005). Fear of falling predicts future falls and conversely, falls predict the development of fear of falling in community-dwelling older adults (Friedman et al., 2002; Lavedán et al., 2018).

As previously mentioned, research conducted on fear of falling in community-dwelling older adults has shown that defining the phenomena can be challenging. To begin with, the definition of fear of falling has evolved since research of the experience started. Murphy and Isaacs (1982) first described fear of falling as a part of "post fall syndrome," when they recognized fear of falling in patients receiving treatment after experiencing a fall. Dingová and Králová (2017) argue that the current meaning has no true conceptual definition because the

terms "…fear of falling, falls efficacy, and balance confidence [are often used] interchangeably." Despite this ambiguity, the concept is consistently linked with physical functioning so many researchers have described fear of falling as a concern or worry that a fall may occur and lead to a decrease in activities of daily living (Lach, 2005; Lavedán et al., 2018). The study of fear of falling is made more complicated by the fact that the phenomenon is dynamic within community-dwelling older adult populations (Lach, 2005; Oh-Park, Xue, Holtzer, & Verghese, 2011) and may be further divided into transient or persistent fear of falling (Oh-Park et al., 2011).

**Significance of Fear of Falling**

Despite difficulties in understanding fear of falling, it is clear that it has significant physical and psychological consequences in community-dwelling older adults. Deshpande et al. (2008) concluded that severe activity restriction caused by fear of falling in community-dwelling older adults resulted in a "decline of physical function" within that population. A later study of older adults, ages 65-74, living in Canada confirmed these results by reporting that fear of falling is associated with the onset of functional disabilities over two years (Auais et al., 2018). Further, Yardley and Smith (2002) determined that community-dwelling older adults reported that fear of falling might come from a concern that a fall would lead to loss of functional independence or "damage to identity." Additionally, a 7-year follow-up longitudinal study that included 3,814 older adults concluded that fear of falling was associated with an increased mortality rate in community-dwelling older adults living in Taiwan, especially older men (Chang, Chen, & Chou, 2017).

**Risk Factors for Fear of Falling**

Inconsistencies in the assessment of fear of falling have added to the difficulty in identifying definite risk factors in community-dwelling older adults and risk factors are likely multifactorial (Lavedán et al., 2018; Scheffer et al., 2008), making it difficult to claim that any single risk factor reliably predicts fear of falling. Nevertheless, identified risk factors can be broken down as internal and external.

One strongly correlated internal risk factor for fear of falling in community-dwelling older adults is being female (Chang, Chen, & Chou, 2016; Denkinger, Lukas, Nikolaus, & Hauer, 2015; Hoang, Jullamate, Piphatvanitcha, & Rosenberg, 2017; Lavedán et al., 2018; Scheffer et al., 2008). Women are more likely to report persistent fear of falling than men (Oh-Park et al., 2011) and women living alone have fear of falling that is more severe than those who live with someone else (Zali, Farhadi, Soleimanifar, Allameh, & Janani, 2017). Other internal risk factors include older age (Hoang et al., 2017; Scheffer et al., 2008), decrease in physical functioning (Denkinger et al., 2015; Hoang et al., 2017; Lavedán et al., 2018), history of falls (Denkinger et al., 2015; Hoang et al., 2017; Lavedán et al., 2018; Scheffer et al., 2008), having poor self-rated health (Denkinger et al., 2015; Hoang et al., 2017; Zijlstra, Van Haastregt, Van Eijk, et al., 2007), depression or anxiety (Denkinger et al., 2015; Hoang et al., 2017; Lavedán et al., 2018), use of multiple or psychotropic medications (Friedman et al., 2002), and comorbidities (Denkinger et al., 2015; Lavedán et al., 2018). Chang et al. (2016) concluded that comorbidities associated with fear of falling were gender-specific among Taiwanese older adults. Prior stroke and diabetes mellitus were risk factors associated with older Taiwanese men, while cardiovascular disease was a risk factor linked to older Taiwanese women (Chang et al., 2016). Another internal risk factor associated with increased fear of falling in community-dwelling

older adults is increased body mass index (Kumar, Carpenter, Morris, Iliffe, & Kendrick, 2014; Ricci Neri et al., 2017). Ricci Neri et al. (2017) found that obese women had "more pronounced" fear of falling than did normal-weight and overweight women but concluded that this might be attributed to the decrease in physical function already associated with obesity.

External risks factors associated with fear of falling in community-dwelling older adults include the use of a walking aid (Denkinger et al., 2015), and lack of support from a spouse or partner (Filiatrault, Desrosiers, & Trottier, 2009). Living in a small or rural community may also increase the chances of developing fear of falling, likely due to worrying about the closeness of help (Filiatrault et al., 2009). Community environmental hazards, such as broken sidewalks, increased traffic, and increased crime, also act as external risk factors that may contribute to community-dwelling older adults having fear of falling, especially when walking around their neighborhoods (Lee et al., 2018). Further, Lee et al. (2018) concluded that outdoor fear of falling was more prevalent with increased age; adults aged 65 years and older were more likely to report fear of falling than middle-aged adults between 50-64 years of age.

**Assessment of Fear of Falling**

Fear of falling has traditionally been measured using a variety of self-report methods that utilize questionnaires and surveys. The shortest of these measurements is the Fear of Falling Scale, which consists of a single question and asks the participant, "How concerned are you that you might fall?" (Greenberg, 2016). Answers are graded on a 1 to 4 scale with one indicating that the participant is "not at all concerned" while a four indicates that the participant is "very concerned" about falling (Greenberg, 2016). Greenberg (2016) concludes that the Fear of Falling Scale is a useful screening tool for community-dwelling older adults but notes that it is used best

in conjunction with more specific measures of fear of falling, like the Falls Efficacy Scale-International (FES-I). The FES-I, created by the Prevention of Falls Network Europe group (ProFaNE), is an updated version of the original FES, which measured ten components of fear of falling, all of which were physical (Dewan & MacDermid, 2014). A short and extended version of the FES-I provide convenience, and both versions include measurements of social elements of fear of falling (Dewan & MacDermid, 2014; Yardley et al., 2005). The FES-I has also been translated into 14 different languages (Dewan & MacDermid, 2014) and tested by ProFaNE in multiple countries (Greenberg, 2016). Other screening measures have been created. Huang (2006) created the Geriatric Fear of Falling Measure (GFFM) using qualitative data obtained from interviews with older adults living in Taiwan about managing fear of falling (Huang, 2005). A study that compared three self-report fear of falling measures used within the community-dwelling older adult population concluded that the GFFM might be the most useful for measuring a change in fear of falling in populations over time, such as when an intervention is utilized (Huang & Wang, 2009).

**Interventions for Fear of Falling**

Interventions targeting community-dwelling older adults have been used to decrease fear of falling in this vulnerable population. To have a fuller picture of possible interventions, Zijlstra, van Haastregt, van Rossum, et al. (2007) completed a review of intervention focused literature published before 2007 to identify interventions that are effective in reducing the fear of falling in community-dwelling older adults. The 19 published works included in their analysis concluded that community-based tai chi, home-based exercise, and multifactorial interventions work best at reducing fear of falling in community-dwelling older adults (Zijlstra, van Haastregt,

van Rossum, et al., 2007). In an attempt to continue research on fear of falling intervention best practices, Whipple, Hamel, and Talley (2018) completed a scoping review of the literature on fear of falling interventions from 2007 through May 2017. Their study found that interventions that combined physical activity and cognitive behavioral therapy were the most effective at addressing fear of falling, as compared to just the use of exercise as an intervention. Whipple et al. (2018) note that further research is needed to address which exercises are the most effective, ranging from balance and strength training to tai-chi activities.

A qualitative study of the impact of falling on frail older adults and their caregivers, conducted by Faes et al. (2010), called for the creation of a fall and fear of falling intervention that included the participation of caregivers. Further, interviews conducted by Dingová and Králová (2017) indicate that there is a benefit to having social support when someone is already experiencing fear of falling. Notably, there is a gap between the use of caregiver support as primary prevention of fear of falling in normally aging community-dwelling older adults.

**Gaps in Fear of Falling Literature**

The literature addressing fear of falling among community-dwelling older adults mostly focuses on quantitative measures, like the FES-I, to gain an understanding of the phenomena. Although some researchers have used qualitative methods to understand different aspects of fear of falling in community-dwelling older adults (Denkinger et al., 2015; Huang, 2005; Králová & Dingová, 2017; Mahler & Sarvimäki, 2012) the overall use of mixed methods to understand the perspective of older adults about fear of falling assessments is limited.

Further, although valid and reliable tools and interventions have been utilized to measure fear of falling, it is not clear what older adults' perceptions of interventions and their usefulness

are. Faes et al. (2010) called for interventions that included caregivers for frail older adults, but research is needed to assess if healthy older adults believe that social support is as useful within the assessments and interventions that address their fear of falling.

This study sought to incorporate the use of quantitative and qualitative data collection to understand further the perspective of the community-dwelling older adults with fear of falling.

## Aims

Aim 1: Assess fear of falling using quantitative measures

Aim 2: Explore older adults' perception of fear of falling assessments and interventions

# Methodology

## Design

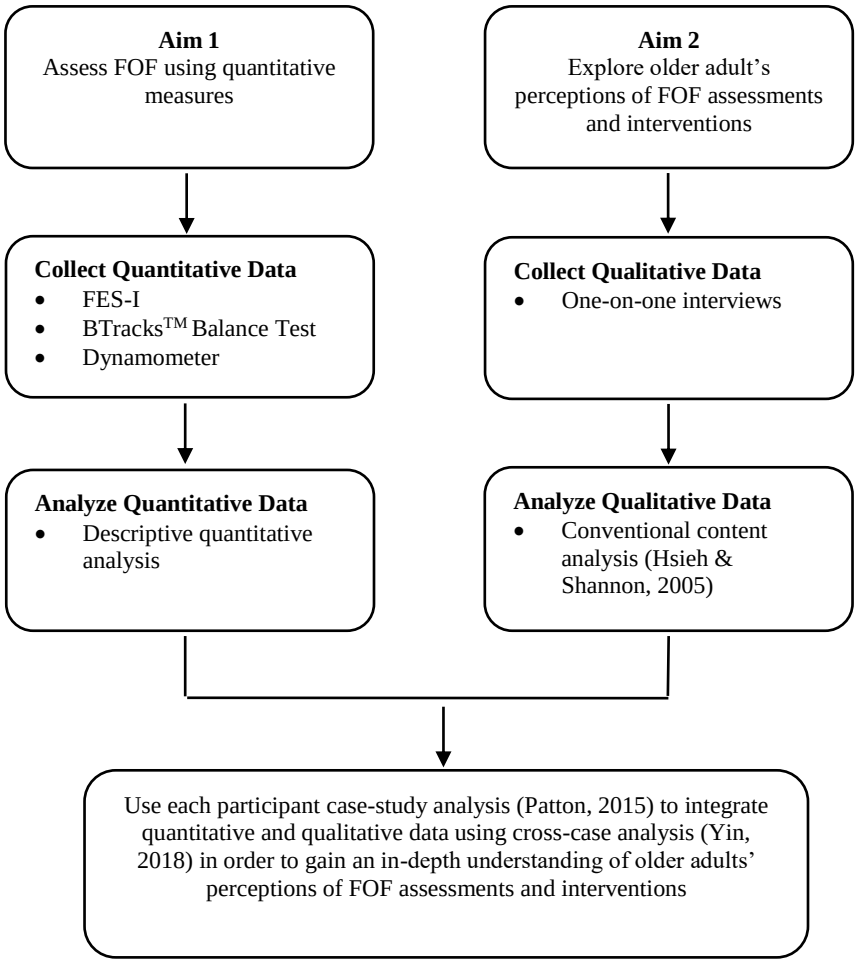


**Figure 1:** Research design diagram

To assess fear of falling and gain an in-depth understanding of older adults' perceptions on fear of falling assessments and interventions, a mixed methods case study was used. This design allowed the researchers to understand and compare the complexity of fear of falling assessments in community-dwelling older adults using two different methods of data collection

(Creswell & Plano Clark, 2018). Please see Figure 1: Research design diagram. This thesis is a part of a research project titled "Fear of falling (FOF) assessment in racial/ethnic older adults: A mixed-methods study" (Principal Investigator: Dr. Ladda Thiamwong). The institutional review board of the University of Central Florida approved this project (IRB ID: MODCR00000036). The researchers of this study (Ms. Amanda Cappleman (AC) and Dr. Ladda Thiamwong (LT)) collected both quantitative and qualitative data.

**Participants**

Four participants total, consisting of two heterosexual, married couples, were recruited into the study by AC using purposive sampling.

**Inclusion criteria.** Participants had to be community-dwelling adults aged 65 years or older with fear of falling. It was determined that the participant had some concern about falling if they rated their concern for any of the 16 FES-I activities at a 2 or above, which would indicate that they were at least "somewhat concerned" about falling during that activity. Participants had to be able to ambulate without the assistant of a walking aid or assistive device. Participants had to be English speaking and with no cognitive impairment as indicated by a verbal confirmation from the participants and their spouse.

**Exclusion criteria.** Adults living in assisted living facilities, utilizing home health care, or who were unable to perform ADLs due to comorbidities or disability were not included in the study.

**Setting**

Participants living at their own home located in the Orlando area were contacted to participate in this study. Participants completed a demographic data sheet, Fear of Falling Scale,

FES-I, BTrackS$^{TM}$ Balance Test, handgrip strength test, and a one-on-one interview at the participant's home.

## Measurements

### Quantitative measurements.

***Demographic survey.*** A demographic survey was used to understand the background of the participants. The survey included 15 questions that addressed age, gender, race, the participant's overall perception of health, education level, financial stress, living situation, family relationships, history of falls and fear of falling.

***Fear of Falling Scale.***

This single question survey asked the participants, "How concerned are you that you might fall?" Answers were scored on a 1 to 4 scale with one indicating that the participant was"not at all concerned" while a four indicates that the participant was "very concerned" about falling (Greenberg, 2016).

***Falls Efficacy Scale-International (FES-I).*** The FES-I is a 16-item questionnaire that allows participants to rate their concern for falling during specific activities at four different intensities, ranging from "not at all concerned" to "very concerned" (Dewan & MacDermid, 2014; Yardley et al., 2005). Responses of "not concerned" are given the score of 1, "somewhat concerned" scored a 2, "fairly concerned" scored at 3 and "very concerned" scored at 4 (University of Manchester, n.d.) and higher scores suggest a more significant fear of falling (Dewan & MacDermid, 2014). After responses from each item are totaled, a score from 16-19 shows "low concern for falling," a score of 20-27 reveals a "moderate concern," and scores between 28-64 indicates a "high concern" for falling (University of Manchester, n.d.). The FES-I

has shown reliability with internal consistency (Cronbach's $\alpha = 0.96$) and test-rest reliability (ICC = 0.96) when used with community-dwelling older adults (Yardley et al., 2005). The FES-I has also been shown to be valid cross-culturally (Kempen et al., 2007).

***BTrackS$^{TM}$ Balance Test (BBT).*** The BBT was completed using a portable force plate that provides immediate and convenient objective measures of balance and fall risk (Balance Tracking Systems, 2016). This fall risk assessment assigned participants to either low, moderate, or high fall risk categories based on their performance (Balance Tracking Systems, 2016). The Balance Tracking System (BTracksS) consists of a BTrackS Balance Plate (BBP) and BTrackS Assess Balance software that requires a computer with a full version of Microsoft Windows 7 or higher, at least one USB port, and internet connection (Balance Tracking Systems, 2016). The BBP weighs less than 15 lbs and has dimensions of 15.5" x 23.5" x 2.5" with a carrying handle (Balance Tracking Systems, 2018). The BTrackS has the approval of the Food and Drug Administration (Balance Tracking Systems., 2016).

The BBT has shown validity ($r > 0.90$) and reliability (ICC = 0.83) in detecting balance changes over time with community-dwelling older adults (Levy, Thralls, & Kviatkovsky, 2018). The BBT is also a valid predictor of future falls in older adults, with those in the low category being 42% less likely to fall than those in the moderate fall risk category and 51% less likely to fall than older adults in the high fall risk category (Goble, 2018).

***Dynamometer.*** A battery-operated CAMRY digital hand dynamometer, model EH101, was used to measure the handgrip strength of the participants. A sensor within the dynamometer can measure handgrip power up to 198 lbs or 90 kgs (CAMRY, n.d.). The lightweight device can be adjusted for different hand sizes (CAMRY, n.d.). Each trial shows the maximum strength

produced by the participant after it is released and the device rates participants performance as "weak," "normal," or "strong" based on the participant's entered age and gender (CAMRY, n.d). The product certification number is GZ0907071005/CHEM, and the issue date was August 25, 2009.

Research has shown that the use of a dynamometer is a reliable screening tool to measure strength in community-dwelling older adults, with an interclass correlation coefficient (Ricci Neri et al.) between 0.941 and 0.981 depending on left or right-hand use (Schaubert & Bohannon, 2005). The same research also notes that handheld dynamometer measures might be indirectly associated with physical functioning (Schaubert & Bohannon, 2005). Notably, increased levels of physical functioning are associated with decreased levels of fear of falling (Halaweh, Willen, Grimby-Ekman, & Svantesson, 2016).

**Qualitative measurement.**

***Interview guide and one-on-one interviews.*** A private, one-on-one interview was conducted with each participant to thoroughly explore participant perceptions of fear of falling and associated assessments and interventions. An interview guide with open-ended questions was used to facilitate the one-on-one interviews and addressed the participant's experiences with fear of falling, risk factors and consequences of fear of falling, perceptions of fear of falling assessments, and perceptions of fear of falling interventions. The following questions are examples of what was included in the one-on-one interview guide. To address participants' experiences with fear of falling, they were asked, "How has fear of falling changed your life?" or "When did you first know that you had fear of falling?" Risk factors and consequences of fear of falling was explored by asking participants "What do you think caused your fear of falling?"

Further, in order to address participants' perspective about fear of falling assessments, we asked, "How often do you think your healthcare provider should assess your fear of falling?" Finally, in order to understand participant beliefs about fear or falling interventions, the researchers asked, "What do you think could decrease your fear of falling?" and "Do you think social support helps decrease your fear of falling, why or why not?"

**Data Collection**

**Quantitative data collection.** Data collection for all four participants occurred in April 2019. Purposive sampling was used by AC to recruit participants to participate in this study. The researchers aimed to have at least four participants complete the study, which was achieved. All four participants chose to conduct the study in their own homes. At each couple's home, a detailed explanation of the study was provided. Once consent was obtained participants were guided through the quantitative measures using the demographic questionnaire, Fear of Falling Scale, FES-I, BTrackS$^{TM}$ Balance Test (BBT) and dynamometer. All these assessments took between 30-40 minutes to complete for each couple.

First, the participant was provided with a copy of the demographic survey, Fear or Falling Scale, and FES-I and given ample time to fill them out completely. Next, the participant was guided through the BBT. The BBP was placed on a firm, flat surface, facing a wall in a non-distracting environment (Balance Tracking Systems, 2016). The participant was asked to stand as still as possible with feet shoulder-width apart, hands on hips and eyes closed (Balance Tracking Systems, 2016). Participants were told that they could open their eyes and touch the wall if they felt that they were becoming unsteady. The researchers also stood beside and behind the participant in case they began to fall. Participants completed four 20-second balance trials, of

which, the first was for practice (Balance Tracking Systems, 2016). Once the four trials were complete, a result screen indicated whether the participant's fall risk is low, moderate or high depending on how far they deviate from the program's average (Balance Tracking Systems, 2016). Scores are also used to compare participant performance to other adults in their age group (Balance Tracking Systems, 2016). Scores were not revealed to the participant until the end one-on-one interview, but the researchers were aware of them immediately.

The final quantitative assessment measured handgrip strength with the use of a hand-held dynamometer. During the assessment, participants were seated in a chair with their nondominant arm by their side, but their dominant hand bent at 90 degrees at the elbow with neutral wrist positioning. Participants completed three trials using their dominant hand. Participants were instructed to squeeze the dynamometer handgrip as hard as they could and then release. The researchers offered 30 seconds of rest between trials. The rounded average score of their three attempts was calculated in kilograms and used to determine grip strength according to normative data provided by CAMRY.

**Qualitative data collection.** After quantitative measures were complete, participants were asked if they were willing to complete a one-on-one interview at the same location, on the same day that quantitative data is collected, or if they would prefer for the one-on-one interview to be scheduled for another date or location. One couple was interviewed on the same day in their home, and the other couple was interviewed two days later, also in their home. Each participant was interviewed privately, and at the beginning of each interview, participants were asked to consent to an audio recording. Interviews lasted approximately 20 minutes each, but participants were informed that they could choose to end their participation in the interview at

any time without needing to justify their decision. After each one-on-one interview was completed, the participants were provided with their quantitative results and corresponding explanations, along with the opportunity to ask questions. Researcher AC was then able to ask how the participants felt about the quantitative assessment strategies used in the study.

**Data Analysis**

Data was analyzed sequentially according to the guidelines of mixed methods design (Creswell & Plano Clark, 2018). A narrative of each case was constructed in which the quantitative data were embedded in the description of each case. For each participant, a descriptive quantitative analysis was completed first. Next, qualitative data was reviewed by applying conventional content analysis to the one-on-one interview data for each participant individually (Hsieh & Shannon, 2005). Conventional content analysis is used to "gain direct information from study participants without imposing preconceived categories or theoretical perspectives" to the data (Hsieh & Shannon, 2005, p. 1280). The transcriptions, completed by AC, were read to obtain a general understanding of the content and the text was sorted by meaning and themes. Two researchers (AC and LT) discussed the interpretations of the themes until a consensus was reached. The use of this type of analysis gives the researchers the ability to develop an understanding of a phenomenon based on the individual perceptions of participants (Hsieh & Shannon, 2005). To combine quantitative and qualitative data for each participant, a case-specific analysis was used, resulting in narratives with a storytelling approach aiming to explore each participant independently (Patton, 2015). This was followed by a cross-case analysis to gain a more comprehensive understanding of the participants in relation to one another (Yin, 2018).

# Results

The results are presented in two sections. First, the narrative of the four cases is presented, including the quantitative data (Tables 1-4), which are embedded in the qualitative data. Second, the results from the cross-case analyses, involving all four cases are presented.

## Narrative Case Studies

**Case one.** Participant 1 was an 87-year-old non-Hispanic white male that is married to and lives at home with his spouse, participant 2. He has a college degree and rarely worries about finances. He perceives his overall health as being very good and reports that he has family support and is often in contact with friends and family. Participant 1 reports that he has experienced 0 falls in the last year, but his wife described an incident with him falling while getting out of the car within the past six months. He reports that he had no fear of falling on the day the study was completed, and he does not limit his ADLs. Participant 1 indicated that he was "not at all concerned" using the Fear of Falling Scale but had a moderate concern for falling according to the FES-I, and weak handgrip strength. The BBT categorized participant 1 as having a high risk of falling. In participant 1's interview, he maintained that he did not have fear of falling. He did think that walking on unfamiliar terrain could contribute to fear of falling in older adults but saw good health, physical activity, and a positive attitude as preventative. While participant 1 felt that family had a role in general support, he did not think family influenced fear of falling in older adults. Participant 1 reported that a healthcare provider had never assessed his level of fear of falling and concluded that he was not sure that it would make a difference if they did. Despite the incongruencies in his perspectives on fear of falling and the quantitative results,

participant 1 had an overall positive perspective of the BBT and hand-grip strength test. He did not agree with the outcome of the FES-I. Despite his high risk of falling according to the BBT, he did not feel like he needed to change his behaviors or ADLs. Participant 1 had a past medical history of a transient ischemic attack.

**Case two.** Participant 2 was an 87-year-old non-Hispanic white female that is married and lives with participant 1. Her highest level of education is high school, and she never worries about finances. Participant 2 perceives her overall health as being good and reports that she has family support and that she sees her friends and family occasionally. She reports that she has experienced two falls in the past year but reported that they did not cause serious injury. Participant 2 claimed that she was somewhat afraid of falling on the day the study took place and that her fear of falling caused her to limit her ADLs somewhat. She reported that she was "fairly concerned" using the Fear of Falling Scale and showed a moderate concern for falling on the FES-I, and normal handgrip strength. The BBT categorized participant 2 as having a moderate risk of falling. During participant 2's interview, she explained that her fear of falling had worsened in the past six months because she had fallen when walking on unsteady terrain. She reported that she felt like aging and the experience of her mother's death being precipitated by a broken hip after a fall contributed to her fear of falling.

Measures taken by participant 2 to decrease her fear of falling include limiting her ADLs and wearing stable shoes. She reported that family relationships do not contribute to an increase or decrease in fear of falling. Despite this opinion, she did appreciate limited help from her family when navigating a physically taxing environment. Participant 2 reported that health care providers had not addressed fear of falling and she believed that was because they had more

important topics to address with their patients and there was not an effective way for them to assess fear of falling in an office environment. Participant 2 also had a positive perspective of the FES-1, BBT, and handgrip strength test. She felt that the results reflected how she perceived herself. Participant 2 has chronic back pain.

**Case three.** Participant 3 was a 77-year-old non-Hispanic white female that is married to and lives with participant 4. Her highest level of education is high school, and she never worries about finances. Participant 3 perceives her overall health as being excellent and reports that she has family support and contact with friends and relatives often. She reported that she had not fallen within the past year and had no fear of falling on the day quantitative data was collected. Therefore, she also did not limit her ADLs. Participant 3 reported that she was "not at all concerned" that she might fall according to the Fear of Falling Scale and had a low fear of falling on the FES-I, and had a strong handgrip strength. The BBT categorized participant 3 as having a low risk of falling. During the one-on-one interview, participant 3 expressed that a physically active lifestyle and social support contributed to her low level of fear of falling.

Further, participant 3 does not remember her health care provider ever addressing fear of falling but notes that it may be more relevant to address if she were a frail older adult. Participant 3 had an overall positive perspective of the FES-I, handgrip strength test, and BBT. Participant 3 had no significant past medical history to report.

**Case four.** Participant 4 was a 78-year-old non-Hispanic white male that is married to and lives with participant 3. His highest level of education is college, and he never worries about finances. Participant 4 perceived his overall health as being excellent and reports that he feels supported by family, having contact with them, and friends, often. He reports that he has not

fallen in the past year and had no fear of falling on the day that quantitative data was collected. Participant 4 reported being "somewhat concerned" he might fall according to the Fear of Falling Scale and had a moderate fear of falling on the FES-I and had a strong handgrip strength according to the dynamometer. The BBT categorized participant 4 as having a low risk of falling. During the one-on-one interview, participant 4 reported that an active lifestyle contributed to his maintaining a decreased level of fear of falling but notes that experiences with his mother falling have caused him to be proactive in implementing safety measures around the home. Participant 4 also believe that he would have an increased fear of falling if he were to live alone instead of living with participant 3.

Further, he reports that his health care provider has never asked about fear of falling but believed that it would be beneficial for healthcare providers to address the topic with anyone over the age of 62. Participant 4 has impaired vision in one of his eyes. This visual deficit does not limit the participant's ADLs.

## Cross-case Analysis

Cross-case findings are presented in sections that include quantitative results and qualitative results. Both similarities and differences in older adults' perception of fear of falling assessments and interventions were found.

### Quantitative results.

**Table 1.** Case characteristics

| Case | Age | Sex | Race | Health | Education | Finances | Lives with: | Family support | Friends & relative contact |
|---|---|---|---|---|---|---|---|---|---|
| **1** | 87 | M | Non-Hispanic white | Very good | College or above | Rarely worries | Spouse | Yes | Often |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **2** | 87 | F | Non-Hispanic white | Good | High school | Never worried | Spouse | Yes | Occasionally |
| **3** | 77 | F | Non-Hispanic white | Excellent | High school | Never worried | Spouse | Yes | Often |
| **4** | 78 | M | Non-Hispanic white | Excellent | College or above | Never worried | Spouse | Yes | Often |

**Table 2.** Summary of falls history and fear of falling per case

| Case | Total falls in past year | Falls that have caused injury | Level of FOF today | Does your FOF limit activities? | Attempted to seek help from a professional? | Why haven't sought help? |
|---|---|---|---|---|---|---|
| **1** | 0 | 0 | Not at all | Not at all | No | "Haven't fallen." |
| **2** | 2 | 0 | Somewhat | Somewhat | No | "Fall not serious enough." |
| **3** | 0 | 0 | Not at all | Not at all | No | "Never fell" |
| **4** | 0 | 0 | Not at all | Not at all | No | "Didn't feel need/never fell." |

**Table 3.** Summary of quantitative fear of falling measures per case

| Case | Handgrip strength | | BTrackS™ Balance Test | | FES-I | | FOF Scale |
|---|---|---|---|---|---|---|---|
| | Mean | Interpretation | Score | Fall risk Assessment | Score | Interpretation | Response |
| **1** | 20.3 kg | Weak | 73 | High | 20 | Moderate | Not at all concerned |
| **2** | 17.53 kg | Normal | 37 | Moderate | 21 | Moderate | Fairly concerned |
| **3** | 26.68 kg | Strong | 23 | Low | 19 | Low | Not at all concerned |
| **4** | 41.14 kg | Strong | 25 | Low | 24 | Moderate | Somewhat concerned |

**Table 4.** Summary of FES-I participant responses

**Note:** 1=Case one, 2=Case two, 3=Case 3, 4=Case 4

| | | **Not at all concerned 1** | **Somewhat concerned 2** | **Fairly concerned 3** | **Very concerned 4** |
|---|---|---|---|---|---|
| 1 | Cleaning the house (e.g., Sweep, vacuum, dust) | 1, 2, 3, 4 | | | |
| 2 | Getting dressed or undressed | 1, 2, 3 | 4 | | |
| 3 | Preparing simple meals | 1, 2, 3, 4 | | | |
| 4 | Taking a bath or shower | 1, 2, 4 | 3 | | |
| 5 | Going to the shop | 1, 2, 3, 4 | | | |
| 6 | Getting in or out of a chair | 1, 2, 3 | 4 | | |
| 7 | Going up or down stairs | 1 | 2, 3, 4 | | |
| 8 | Walking around in the neighborhood | 1, 2, 3 | 4 | | |
| 9 | Reaching for something above your head or on the ground | 2, 3 | 1, 4 | | |
| 10 | Going to answer the telephone before it stops ringing | 1, 2, 3, 4 | | | |
| 11 | Walking on a slippery surface (e.g., Wet or icy) | 3 | 1, 4 | 2 | |
| 12 | Visiting a friend or relative | 1, 2, 3, 4 | | | |
| 13 | Walking in a place with crowds | 1, 2, 3, 4 | | | |
| 14 | Walking on an uneven surface (e.g., rocky ground, poorly maintained pavement) | | 1, 2, 3, 4 | | |
| 15 | Walking up or down a slope | 3 | 1, 2, 4 | | |
| 16 | Going out to a social event (e.g., religious service, family gathering or, club meeting) | 1, 2, 3, 4 | | | |

**Qualitative results.** Analysis of the one-on-one interview transcripts revealed four themes related to older adults' perceptions of fear of falling assessments and interventions: 1) feedback from an objective measure is valuable; 2) family experiences with fear of falling drive personal interventions; 3) fundamental assessments for fear of falling are missing, and 4) fluctuating definitions of "fear" contribute to difficulty in assessments and interventions.

***Theme 1: Feedback from an objective measure is valuable.***

Despite having varying levels of fear of falling and assessments results, all four participants expressed that the assessments, particularly the BBT and handgrip strength test were beneficial for providing feedback about their physical abilities or possible limitations. Three of the four participants perceived themselves similarly to their quantitative results and expressed that assessment feedback can be valuable in decreasing fear of falling or preventing it from worsening. For example, case four explained that he believed fear of falling could be decreased by *"…having someone say you are doing really well. Or you know, you should really work on your core strength or something."*

Interestingly, case one had a positive view of the BBT and dynamometer before learning of his assessment results but expressed that even though the BBT indicated a high risk for falling and the dynamometer indicated weak handgrip strength, he did not feel the need to make behavioral changes or implement new interventions. When asked if he thought there were tools that were helpful for detecting fear of falling or risk for falling, case one responded that *"…standing on that machine. I think that's a good idea. It seems like a long time, but you know, I think that's a good idea."* When asked what he thought of the dynamometer, case one explained that, "*If you've got a good grip, if you do have fear of falling, then you'd be able to catch yourself or brace it."*

In addition to desiring feedback, multiple cases expressed an interest in being retested, especially for balance using the BBT, in the future. One case expressed that her desire for retesting stemmed from the fact that she realized even though she did not have a significant fear of falling now, she knew *"…it can start at any time, you know, all of a sudden, boom."*

***Theme 2: Family experiences with fear of falling drive personal interventions.***

All four participants expressed that they felt generally supported by friends and family and that social support was essential for overall health. Despite this, participants expressed that staying physically active, wearing supportive and safe footwear, and having a positive attitude had a more significant impact on decreasing fear of falling than family intervention or support. For example, case two described an outing she had with her family where her daughter tried to have her sit in a wheelchair after arriving at their destination because the daughter was concerned about the amount of walking the participants would have to do. Although case two noted that she was eventually relieved that one of the family members brought out a wheelchair toward the end of the day, she expressed her frustration with her family by stating, *"I got along alright, and I feel like as long as I can get along, why sit in a wheelchair?"*

Three of the four cases expressed that some of the measures they take now to protect themselves from falling and decrease their fear of falling were motivated by experiences they shared with family members who have fallen or had fear of falling. A variety of factors drove these self-interventions: The first was the perception that a fall ultimately caused a family member's death. Case two explained that at least some of her fear of falling stems from the fact that her mother had broken her hip and, " *that is basically what killed her."*

Another case described that a family member's fear of falling was related to the absence of a physically active lifestyle, which motivated the participant to stay active. The participant explained that she has "*done athletic things"* all her life but her sister, who has fallen and

expressed fear of falling *"…didn't do anything really active athletic wise, you know, but I continued to do that, so, I think, helped."*

Finally, another participant described caring for his mother as she aged and noted how that impacted the choices he makes now to protect himself and his wife from fear of falling or adverse effects of possible falls. During his one-on-one interview, he explained that seeing his mother have difficulty with ADLs made him *"conscious of rugs and conscious of trips around the house, things that trip you that stick out, corners, that kind of thing."* This participant also explained that when he and his wife were having their current home built, he made it a priority to have rounded corners put on all countertops.

***Theme 3: Fundamental assessments for fear of falling absent***

None of the participants had ever had their fear of falling or risk for falling assessed before agreeing to participate in this study, and all four participants stated that fear of falling was not explicitly asked about during appointments with their primary care providers. One participant felt strongly that older adults should have a conversation about fear of falling and falls with their primary care provider once they reached the age of 62 or were participating in Medicare or Social Security programs.

***Theme 4: Fluctuating definitions -fear, concern, or awareness?***

Throughout all four interviews, there were moments when participants would suggest, explicitly or in more nuanced ways, that the phrase "fear of falling" did not fit precisely with their perception of themselves. Instead, participants would refer to the phenomenon they were identifying with by using terms like "concern' or "awareness." For example, one participant described an example of a recent fall she experienced while she was hiking in the

mountains and came across some slippery rocks. She explained that she "*... knew we always had to be careful getting near the river on the slippery rocks. And so that came, you know, be careful, you know its slippery. Well, I slipped…But um, I wasn't afraid of slipping. I was just aware to be careful because I had been doing that all my life. We've been going up to this place, you know, forever and um so, yes. I slipped, you know, and fell but I wasn't fearful of it, well, unless you call that being fearful. When you think about it, to be careful, you know because this is slippery. I don't know if that's considered fear or just…awareness."*

## Discussion

The purpose of this study was to assess fear of falling in community-dwelling older adults and explore participant perceptions of fear of falling assessments and interventions. One of the objectives of HealthyPeople2020 is to prevent an increase in fall-related deaths among older adults, but as of 2017, the number of deaths caused by unintentional falls has increased (U.S. Department of Health and Human Services, n.d.). In order for health professionals to see improvement in these outcomes, holistic fear of falling assessments must drive intervention design and implementation. The four themes found by this research support the need for the combined use of subjective and objective assessment measurements.

The findings of this study revealed that older adults believe feedback from objective measures can be valuable in decreasing fear of falling or preventing it from worsening. As previously mentioned, fear of falling has traditionally been assessed using a variety of self-report measures, such as the Fear of Falling Scale, FES-I, and Geriatric Fear of Falling Measure (GFFM) (Dewan & MacDermid, 2014; Huang, 2005; Yardley et al., 2005). Although these measures give us some insight, participant responses suggest that it may be beneficial for older adults to have objective feedback during fear of falling assessments. The use of objective feedback measures can add value to both the creation of tailored, holistic interventions, and improve participant adherence to interventions (Essery et al., 2015). For example, participant one reported that he was "not at all concerned" that he might fall on the single question Fear of Falling Scale, but his level of concern was reported differently on his FES-I, which indicated a moderate concern for falling. This participant then completed the BBT, which indicated a high risk of falling. When talking to this participant, after revealing these results, he reported that he

still considered himself to be “not at all concerned.” This case revealed that there was an incongruence between the participant’s perceived fall risk and physiological fall risk. Interventions for an older-adult with incongruent fear of falling should be different from interventions from older adults who have a fear of falling that is similar to their fall risk.

Additionally, this study identified that family experiences with fear of falling drive personal interventions. Dingová and Králová (2017) have already supported the idea that family can play a positive role in the lives of individuals with fear of falling. While participants in this study confirmed that family support made them feel safer in general, they also communicated that there was a limit to the usefulness of family support with fear of falling, which was also supported in a study conducted by Honaker and Kretschmer (2014), which studied the impact of fear of falling on patients and their caregivers. All four participants described experiences with family members who have experienced adverse effects of fear of falling or actual falls to be more impactful on their perspective of fear of falling and fear of falling interventions.

Also, this study found that fundamental assessments for fear of falling are absent. All four participants in our study had never discussed fear of falling before. Previous studies, such as one conducted by Mahler and Sarvimäki (2012) in Finland with older adult women, also found that older adults are frequently not asked about fear of falling. This lack of communication about the subject highlights the need for increased focus on primary prevention measures for the older adult population. Research has shown that fall risk awareness can drive behaviors that may decrease fall risk in older adults, who generally have low fall risk awareness (Verghese, 2016). Fall risk awareness can be improved in the older adult population through comprehensive fear of falling assessments.

Furthermore, this study pointed out that the fluctuating definitions of "fear" contribute to difficulty in assessments and interventions. This finding is confirmed by a study completed by Dingová and Králová (2017). They have highlighted the fact that the current meaning of fear of falling is ambiguous, lacking a clear definition in the literature and often used interchangeably with "falls efficacy" or "balance confidence." This ambiguity was further observed in our study, with participants showing hesitancy to use the term "fear" but instead choosing words like "concern" or "awareness" to describe their perspectives. The term "fear of falling" seemed to imply an increased severity of the participant's perspective or situation. Participants explained that their level of concern was increased only during specific tasks and that they were not necessarily thinking about falling all of the time. Their concern is not at a constant level. This finding is supported by Lach (2005) and Oh-Park et al. (2011) who have described fear of fall as a dynamic phenomenon within the older adult population. Notably, all of the participants in our study had a low to moderate concern for falling according to the FES-I. It is possible that the term "fear" may feel more appropriate for an older adult that describes a high level of concern for falling.

## Limitations

Although this study provided us with a greater understanding of the perspective of older adults and fear of falling assessments and interventions, limitations do exist. One limitation is the small number of participants that were recruited to participate in the study. Although the small sample size allowed the researchers to gain an in-depth understanding of the topic, there is limited generalizability of these ideas to other populations. It is also worth noting that generalizability is further limited due to the similarity of the participant demographics. All four participants were non-Hispanic white, married, living in Orlando, and felt that they had the support of their family. Another limitation of the study is that one-on-one interviews were conducted at different time intervals after quantitative data was collected. The researchers attempted to limit the interval between quantitative and qualitative data collection but were restricted by individual participant schedules.

# Conclusion

In conclusion, clear perceptual themes developed and provided a comprehensive understanding of community-dwelling older adults' perceptions of fear of falling assessments and interventions. These themes showed some consistencies with previous literature and emphasized the need for comprehensive and individualized fear of falling assessments and interventions for community-dwelling older adults. Further, these themes revealed clear nursing and research implications to be considered in the future

## Nursing Implications

First, nurses can initiate fear of falling and fall risk assessments for community-dwelling older adults. These assessments may be perceived as more helpful to older adults if they include feedback and education to improve awareness and health outcomes for this population. Further, nursing interventions should consider the physiological and perceived fall risk of community-dwelling older adults using subjective and objective assessment measures. Nursing interventions for fear of falling may not be appropriate if interventions do not address whether or not the older adult has a congruent fear of falling and fall risk.

## Research Implications

Further research is needed to determine how to best combine feedback-oriented assessments with established interventions, such as exercise. Standardization of a subjective measure for fear of falling to use in combination with objective measures is also needed.

# Appendix A

## Demographic survey

**1. How old are you today? _____**

**2. Gender**

□ Male □ Female

**3. Race/Ethnicity**

□ African American □ Asian □ Hispanic □ Non-Hispanic White

**4. In general, how would you say your health is?**

□ Excellent □ Very good □ Good □ Fair □Poor

**5. Education level**

□ Lower than high school □ High school □ College or above

**6. How often are you anxious about your financial situation?**

□Always □Often □ Occasionally □Rarely □Never

**7. Who lives with you?**

□Alone □Partner/spouse □ Family/friend □Other, please identify _____

**8. Do you have family support?** □Yes □No

**9. How often are you in contact with your friends/ relatives?**

□Often □ Occasionally □Rarely □Never

**10. How many times have you fallen in the past year?** □ none □_____time(s)

**11. How many of these falls caused an injury (causing you to limit your activities for at least 1 day or to go see a doctor)?** _____ times

**12.Today, how fearful are you of falling?**

□ Not at all □ A little □ Somewhat □ A lot

**13.Does your fear of falling limit your activities?**

□Not at all □A little □Somewhat □A lot

**14. Have you ever sought any help from a doctor or other health care professional following any falls or instability?**

□Yes □No

**15. If no, what stopped you from receiving information? _____**

# Appendix B

## Fear of Falling Scale

Please check the appropriate box

| | Not at all concerned 1 | Somewhat concerned 2 | Fairly Concerned 3 | Very concerned 4 |
|---|---|---|---|---|
| How concerned are you that you might fall? | | | | |

# Appendix C

### Falls Efficacy Scale International (English)

I would like to ask some questions about how concerned you are about the possibility of falling. For each of the following activities, please circle the option closest to your own to show how concerned you are that you might fall if you did this activity. Please reply thinking about how you usually do the activity. If you currently don't do the activity (example: if someone does your shopping for you), please answer to show whether you think you would be concerned about falling IF you did the activity.

| | | Not at all concerned 1 | Somewhat concerned 2 | Fairly concerned 3 | Very concerned 4 |
|---|---|---|---|---|---|
| 1 | Cleaning the house (e.g. Sweep, vacuum, dust) | | | | |
| 2 | Getting dressed or undressed | | | | |
| 3 | Preparing simple meals | | | | |
| 4 | Taking a bath or shower | | | | |
| 5 | Going to the shop | | | | |
| 6 | Getting in or out of a chair | | | | |
| 7 | Going up or down stairs | | | | |
| 8 | Walking around in the neighborhood | | | | |
| 9 | Reaching for something above your head or on the ground | | | | |
| 10 | Going to answer the telephone before it stops ringing | | | | |
| 11 | Walking on a slippery surface (e.g. Wet or icy) | | | | |
| 12 | Visiting a friend or relative | | | | |
| 13 | Walking in a place with crowds | | | | |
| 14 | Walking on an uneven surface (e.g. rocky ground, poorly maintained pavement) | | | | |
| 15 | Walking up or down a slope | | | | |
| 16 | Going out to a social event (e.g. religious service, family gathering or, club meeting) | | | | |
| | Subtotal | | | | |
| | | | | Total | /64 |

# Appendix D

## Fear of Falling One-On-One Interview Guide

**Pre-interview procedures**

1. Introductions
2. Explain purpose of interview
    a. Understand participant's perspective of fear of falling.
3. Explain format of interview
    a. We will be asking you questions and listening to your responses. We anticipate that the interview should last between 60-90 minutes. You are able to end the interview at any point without having to explain why.
4. Explain that the interview is being recorded so we do not miss any part of the conversation.

**Interview questions**

*Experience of fear of falling*

- Do you have fear of falling or worry about falling?
    - *Possible probes*
        - How severe is your fear of falling? How long do you think your fear of falling will last? Do you think your fear of falling will improve or worsen over time?
        - What has it meant to you to know you have fear of falling and how has it changed your life? Can you provide an example?
        - How do you feel like changes in your physical functioning or aging have affected your fear of falling?
- When did you first know that you had fear of falling and did something specific happen that made you realize you had it?
    - Accident or something that happened on own
- What makes you more aware of your fear of falling or fall risk?

*Risk factors and consequences of fear of falling*

- What do you think caused your fear of falling?
- How has culture influenced your fear of falling?
- How has your environment influenced your fear of falling?
    - What do your loved ones/friends think about your fear of falling?
    - How do you think your family influences your fear of falling? How do you think your fear of falling influences your family?
- How has your fear of falling impacted you?
- What do you worry about most with your fear of falling or fall risk?

*Fear of falling assessments*

- How often does your healthcare provider assess your fear of falling? How often do you think your healthcare provider should assess your fear of falling?
- What kind of tool do you think should be used to assess for fear of falling?
    - *Possible probes*
        - Subjective tools: questionnaires or checklists? Why?
        - Objective tools: biomechanical measures, technology? Why?

*Fear of falling interventions*

- What do you think could decrease your fear of falling?
- What have you done in an attempt to decrease your fear of falling? How has it worked?
- Do you think that social support is helpful in decreasing fear of falling, why or why not?
    - What type of relationships would be/are the most helpful?
- PROVIDE PARTICIPANTS WITH RESULTS OF BTT

*Closing*

- What is one piece of advice you would give to someone who has fear of falling?
- Is there anything else that you would like to share about your perspective and experiences with fear of falling?

**Post-interview procedures**

1. Give participant time to ask any questions or address concerns about the interview.
2. Turn off recording
3. Provide and explain results of quantitative fear of falling assessments, giving participant an opportunity to clarify and ask questions.

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