

Fall Risk Assessment in Community- Dwelling Older Adults: An Explanatory Sequential Mixed Methods Study

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FALL RISK ASSESSMENT IN COMMUNITY – DWELLING OLDER
ADULTS: AN EXPLANATORY SEQUENTIAL MIXED METHODS STUDY

by

MARYANN DOOL

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

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University of Central Florida

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ABSTRACT

Aims: 1) To determine fall risk assessment using subjective and objective measures; 2) To understand older adults' perception on fall risk assessment.

Methodology: An explanatory sequential mixed methods design was used and consisted of two phases. Phase 1, the quantitative data was collected from nineteen older adults at an independent living facility in Orlando, Florida. Phase 2, the qualitative data was collected from three participants of Phase 1. After obtaining Institutional Review Board approval, the study was conducted at Lutheran Towers an independent living facility located in the downtown area of Orlando, Florida. Three measurement tools were used: demographic data sheet, an objective tool: BTrackS™ Balance Test (BBT), and Short Falls Efficacy Scale-International (FES-I).

Results: In phase 1, 37% of participants had a high risk for falls assessed by the objective measure (BBT), and about 11% had high concern of fall risk assessed by the subjective measure (Short FES-I). Approximately 32% had congruent results between subjective and objective measures and 68 % presented incongruent results between subjective and objective measures. In phase 2, three themes were generated from the qualitative data :1) Perception and experience on fall risk assessment; 2) Perception of the subjective measure (Short FES-I) and 3) Perception of the objective measure (BBT).

Conclusion: Those who have incongruent perceptions of their fall risk and physical abilities are most at risk. Performing fall risk assessment using both subjective and objective measures is critical for developing fall prevention plans, to identify those most at risk.

Keywords: Assessment, Falls, Older Adults, Perception, Risk

DEDICATION

This dissertation is dedicated to my grandmother and my family, and my friends.

Thank you, Grandma, for being my number 1 supporter and for giving me the inspiration for
this study.

Thank you, Mom and Dad, for supporting me in throughout my nursing career. I wouldn't have
been able to do this without you.

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INTRODUCTION

In 2015, the United States was at the beginning of a demographic shift, represented by the generation known as the “Baby Boomers” aging. Baby Boomers are those born in the mid-1940s to the mid-1960s. The number of Americans 65 years or older in 2015 was 43.1 million or 14.8 % of the population (Ortman, 2014). It is predicted that by 2030 that number will have grown to 72.7 million or 20.3% of the population. This is an increase of 37% from 2015 to 2030 as a percentage of population for Americans over 65 years of age (Ortman, 2014).

In the United States on average each year more than 1 in 4 older adults will have a fall (Centers of Disease Control and Prevention,2017). The Centers for Disease Control and Prevention, after analyzing the 2014 Behavioral Risk Factor Surveillance System noted 27,000 older adults sustained fatal falls, 2,800,000 older adults were treated in the emergency room for injuries related to falls and 800,000 were admitted. With the increasing geriatric population and constant fall rates due to aging among older adults, an increasing number of older adults will be treated in hospitals for fall related injuries (Bergen, Stevens, & Burns, 2016).

Exacerbating the situation, Mercer’s US Health External Labor Market Analysis projects that by 2025, the United States will have a shortage of 446,300 health aids. With the projected shortage of health care providers and increasing geriatric population, falls will heavily impact the medical resources available to older adults.

The societal consequences of falls include the cost to Medicare. In the 2011, the Medicare Current Beneficiaries Survey (MCBS) showed that 23.9% of older adults, over 65 years of age, reported having had at least one fall. In the year 2015, the number of older adults who sustained fatal falls had risen to 28,486. These deaths resulted in medical expenses to

amount of approximately 754 million dollars (Florence et al., 2018). Identifying risk factors and decreasing the number of falls sustained by older adults would have a positive impact on the individual quality of life and life expectancy as well as reducing societal expenditures associated with falls.

One risk factor for falls in older adults is the fear of falling. The fear of falling is prevalent in both older adults who have sustained falls and those who have not fallen. The fear of falling among older adults who have fallen ranges from 21-85% and in those who have not fallen from 33-46% (Chippendale & Lee, 2018). Older adults, who have fallen have a greater fear of falling than those who have no history of falls. Having a history of falls, increases the likelihood of falling again.

A fall risk assessment is an essential method to identify fall risk in older adults. It should be conducted by health care professionals in order to determine the need for an intervention. There are many different types of fall risk measurement tools, including objective measures and subjective measures. Some of the subjective fall risk assessment tools included the “Stopping Elderly Accidents, Deaths Injuries”, “Falls Efficacy Scale– International” and “Activities-Specific Balance Confidence Scale”. The Centers for Disease Control and Prevention (CDC) has created the Stopping Elderly Accidents, Deaths and Injuries (STEDI) questionnaire as a fall risk screening tool. This tool is used to raise concerns about falls (Phelan , 2015). It gathers information about past falls, difficulties with balance or gait and medication. Health care providers use this tool as a way to address fall risks with their patients and limit modifiable risk factors. This opens up communication channels between health care professionals and the

patients in a primary care setting. This tool creates awareness with the patient, but it is also necessary to understand their real and perceived fall risk.

The FES-I questionnaire is used to determine how concerned an individual is about falling while completing 16 different activities of daily living and social engagements. The FES-I questionnaire assesses the individual's concern of falling into four different categories and asks them to rate the level of concern regarding falling. The Activities-Specific Balance Confidence questionnaire consists of answering questions on their confidence levels for an activity. Individuals answer questions on a scale of 0-100% such as "How confident are you that you will not lose your balance or become unsteady, when you undertake the following activities" (Smee, Berry, Anson, & Waddington, 2017). The limitations of these subjective tools are they only collect a subjective assessment based on participants' perception, not a measurement of their physiological capabilities.

Another group of fall risk assessment tools are classified as objective measures including the "Timed Up and Go Test" (TUGT) and the "Berg Balance Scale" both are performance tests. The purpose of the TUGT is to determine how well an older adult can perform activities. A score is given based on the time it takes the individuals to complete activities including standing, sitting, walking and sitting back down within a certain period. The TUGT measures the functional mobility of the participant (Landers, Oscar, Sasaoka, & Vaughn, 2016). While the Berg Balance Scale assesses 14 tasks related to balance, the participant is given a score on each task related to the stability of the participants. For both assessment tools, the assessors must be educated and trained by a specifically qualified health care professional. Limitations include assessors who incorrectly evaluate the execution of the tasks needed to complete the test yielding

incorrect results (Landers et al., 2016). Another limitation of these performance tests is the logistics needed to conduct them. The Berg Balance Scale requires a 15 foot walkway, footstool and two chairs. These items may not always be accessible in a community with older adults. As a result, it can be an impractical assessment tool to use in the community.

With the development of technology, objective data is easier to collect in a community setting. The Biodex SD can be used to gather information about the center of pressure of the participant. The center of pressure is a tool used to measure the participant's balance. This machine is used to detect the balance of the participants and will give feedback on their performance. The downside of this machine is its lack of portability, and thus not the best item to use in order to gather data from multiple communities (Riemann, Lininger, Kirkland, & Petrizzo, 2018). On the other hand, the BTrackS Balance Test (BBT) does not have the issue of portability. This machine provides objective assessment data relating to balance performance. It has a rectangular footprint of 0.4 m x 0.6 m in area and weight of 14.5lbs allowing it to be easily portable. With its functionality and portability, it is an ideal tool to use in a community with older adults (O'Connor, Baweja, & Goble, 2016).

Using objective and subjective measures to gather information regarding falls creates a better prevention plan for fall rather than just one. In past studies, many used the Activities-Specific Balance Confidence (ABC) questionnaire, Fear of Falling Avoidance Behavior questionnaire and the Timed Up and Go Test. There have been a limited amount of studies conducted in the United States that included objective data for balance and subjective assessments regarding the fear of falls in a community setting (Landers et al., 2016). Combining the subjective data with objective data creates a stronger risk assessment and a more accurate fall

risk assessment than each independently. In addition, there is a lack of research on healthy older adults' perception on their fall risk and fall risk assessment. Understanding fall risk assessment from older adults' perspective could be extremely valuable for supporting the need of fall risk assessment

Research objectives:

1. To determine fall risk assessment using subjective and objective measures
2. To understand older adults' perception on fall risk assessment

METHODOLOGY

Research Design

An explanatory sequential mixed methods design was used in this study. This method of data collection included two phases. In the first phase, the quantitative data was collected and then in the second phase the qualitative data was collected. (Please see Figure 1). The purpose of this method was to use the qualitative results to further the analysis and findings from the quantitative data collection. Using this method combined the two levels of data collection together in order create stronger data and analysis (Creswell, 2015).

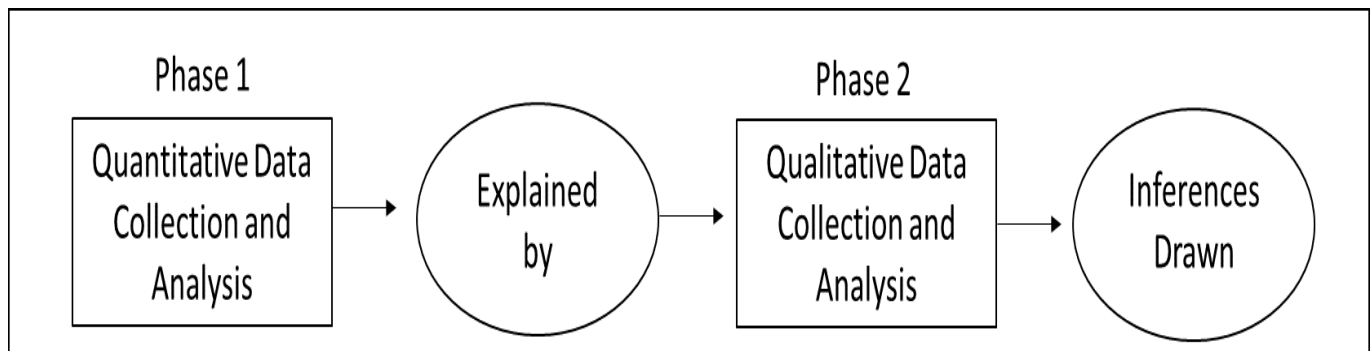


Figure 1:Diagram of an explanatory sequential mixed methods design (Creswell, 2015)

Setting

After obtaining Institutional Review Board approval, the study was conducted at Lutheran Towers an independent living facility located in the downtown area of Orlando, Florida. The residents in Lutheran Towers were 55 years of age and older with approximately 203 residents in the independent living facility. The residents of the Lutheran Towers have many services provided onsite including a weekly maid service that provides vacuuming, dusting and cleaning of the bathroom; and maintenance services that includes plumbing, heat and air conditioning, among many other amenities. An additional benefit of living there includes the transportation to offsite healthcare provider visits and shopping centers.

The facility also provides wellness programs that promote exercises such as Tai Chi, yoga and walking groups. The staff also offers continuing care for older adults who need more assistance. The assisted living facility helps in administration of medication as well as nursing care for emergencies ("Orlando Senior Health Network ", 2019).

Participants

Inclusion criteria

Eligibility in this study required a participant to be 65 years of age or older, and resident of the Lutheran Towers. An additional requirement was to be able to read and understand English. Allowances were made for a participant to use an assistance device (such as: cane, walker) to walk, however they were required to have the ability to stand without the assistance device for 3-5 minutes.

Exclusion criteria

Those who were unable to stand (for 3-5 minutes), returning from a hospital stay, had uncontrolled blood pressure, reported dizziness, or were unable to complete the questionnaire were deemed ineligible to participate.

Instruments

The data collection tools used in this study included a demographic data sheet, the BTrackS™ Balance Test (BBT), Short Falls Efficacy Scale-International and focus group interview guides.

Demographic Data Sheet:

The demographic data sheet consisted of 15 questions such as age, gender, education level as well the participant's history of falls.

The BTrackS™ Balance Test (BBT):

The BTrackS™ Balance Test is a balance scale that used an inverted pendulum device to mimic human postural sway. Postural sway was assessed while an individual stood upright, and changed their posture based on oscillatory motion. Previously, it has been shown that the more amount of postural sway an older adult has, they have a higher risk for falls (Levy, Thralls, & Kviatkovsky, 2018).

From the The BTrackS™ Balance Test , the postural sway of an individual was detected as the center of pressure which changes position over time. The system provided a means to measure postural sway with a high degree of accuracy and precision. The system was reported to have excellent reliability in internal consistency reliability and in 3 day retest for reliability (Levy et al., 2018). The system reported the measured postural sway as a score from 0-100. A

score in the range of 0-30 yielded a low risk for falls, 31-38 a moderate risk for falls and 39-100 a high risk for fall (Balance Tracking System, 2018). The researcher (Ms. MaryAnn Dool: MD) was trained and guided by Dr. Ladda Thiamwong (LT), who is an expert in geriatric falls. The BBT was conducted by the researchers in accordance with the manual.

Short Falls Efficacy Scale-International (FES-I):

The Short FES-I tool or questionnaire has been developed and expanded on the first Falls Efficacy Scale, the expansion included more activities including activities of daily living and its acceptance has resulted in it being translated into many different languages (Greenberg, 2019). The Short FES-I has been found to have excellent internal validity, in addition to test – retest reliability. The reliability is of Cronbach’s alpha= 0.96 and the retest ICC=0.96 (Greenberg, 2019). The questionnaire is used to measure the level of concern regarding falling while performing 7 different physical activities.

The participant used the questionnaire to rate how concerned they were about the possibility of falling during the seven 7 different activities. The levels of concern were labeled as: not concerned at all, somewhat concerned, fairly concerned and very concerned. The final scores are low concern (score: 7-8), moderate concern (score: 9-13) , high concern (score: 14-28).

One of the social activities addressed in this tool included “visiting a friend or relative”. This topic was important to address because feeling very concerned about the possibility of falling can limit exposure to others and can lead to isolation.

Focus group interview guides

The focus group interview guides were developed based on a literature review.

In the focus group the questions covered:

1. What do fall risk assessments mean to you?
 - What types of fall risk assessments do you know of or have experienced?
 - What is the purpose of a fall risk assessment?
2. Perception on fall risk and fear of falling (a subjective measure)
 - After completion of the Falls Efficacy Scale-International, what do you believe to be its purpose?
 - During which activity (cleaning the house, getting dressed...etc.) from the FES-I do you feel most concerned with falling?
 - During which activity (cleaning the house, getting dressed...etc.) from the FES-I do you feel least concerned with falling?
3. BTrackS™ Balance Test (an objective measure)
 - What did you think about this fall risk assessment tool?
 - Did you find it difficult to stand for 3-5 minutes on the scale?
4. Results
 - What do you think of your fall risk results from these two tests?
5. Attitudes after fall risk assessment
 - After knowing your fall risk results, do you think you will change the way you perform different activities?
 - If you will change the way you perform different activities, what will you change?
 - Do you believe these fall risk assessment tools are helpful to prevent falls? If so, how? If not, what would be more helpful?

DATA COLLECTION

Phase I Quantitative Phase

The recruitment process included the researcher (MD) contacting Mrs. Bonnie Mobley Director of Social Services. Mrs. Mobley agreed to place recruitment flyers on the activities board provided by the researcher. Nineteen participants were screened based on the inclusion and exclusion criteria and provided their informed consent to participate. Participants filled out the demographic sheets followed by the Short FES-I. After the completion of written portion, they then took the BTrackS™ Balance Test. The data collection and test were performed by the researchers (MD and LT).

First the BTrackS™ Balance Plate was placed on the ground with a sturdy surface. Then a calibration was performed before the test was conducted. The participants were asked to remove their shoes and stand as still as they could on the plate for 3-5 minutes with their hands on their hips and eyes closed. The participants were instructed to open their eyes if they felt unsteady and reach for the walker that had been placed in front of them as a safeguard. As an additional precaution, the researcher remained behind the participant during the test to prevent the participant falling backward away from the walker. The system successfully detected and analyzed the participants' balance and provided their scores.

Phase II Qualitative Phase

After phase I was completed, the researcher (MD) analyzed the data to form and select the participants into the focus group. Six participants were chosen based on the incongruent between the BTrackS and the Short FES-I results and only three were able to attend. The three participants which were unable to attend had conflicting events, such as doctors' appointments.

For this phase II, the Short-FES-I was classified into two levels including: low concern of falling (score 7-10) and high concern (score: 11-28) of falling. The BTrackS classifications were low risk to fall (score: 0-30) and high risk to fall (score: more than 310).

The researcher (MD) was trained by Dr. Ladda Thiamwong (LT) to conduct the focus group. The focus group was held in a secluded and quiet place at the Lutheran Towers which commenced with an introduction by the researchers (MD and LT) and an overview of the purpose for the focus group. The purpose of the focus group was to encourage participants to share their experience on their fall risk and fall assessment and address their experience with the fall risk assessments and address the questions in the interview guides. The group was informed that the session was being recorded during the allotted 60 minutes. The focused group lasted 61 minutes.

Data Analysis

Quantitative data analysis

The BTrackS™ Balance Test provided data regarding the objective measure of the participant's tactic balance performance. All of the quantitative data gathered by the researchers over the course of the study was analyzed by IBM SPSS Statistics software program (version 24), and this statistical analysis included frequency, percentage, and descriptive statistics of the demographic data, Short FES-I score and BBT score.

Qualitative data analysis

After the focus group was conducted, the researcher (MD) transcribed the recording of the focus group session. Following this further, recurrences and content analysis was used to gather an understanding of the older adults' perception of fall risk assessments. The conventional

content analysis approach described in Hsieh and Shannon (2005) was used in this study. First, the data was collected through the focus group interview where open-ended questions were used. Second, the interview was listened to and transcribed by MD. Third, both researchers sorted into the meaning, interpreted the meaning separately, and made notes of the impression's thoughts and initial analysis. Finally, the related codes were linked and then sorted into themes (Hsiu-Fang & Shannon, 2005).

RESULTS

Phase 1 Quantitative Results

In phase 1, the results were presented into four sections including: 1) characteristics of the participants; 2) fall risk assessment using the subjective measure; 3) fall risk assessment using the objective measure; and 4) fall risk assessment comparing between subjective and objective measures.

Characteristics of the participants

The majority of the participants were female (89.5 %), with all of them reporting as non-Hispanic White. Seventy percent had a college or higher education. About 47% of the participants perceived their general health was very good. When asked about anxiousness regarding their financial situation, 74% responded with rarely had financial problem. Most of the participants' lived alone, and 21% living with a partner or spouse. When prompted about family support, around 79%, said they had their family support such as financial support and emotional support. About 90% of the participants disclosed that they were in contact with their friends. About 26% of the participants (n=5) had history of fall and only three of them received help after they had a fall. Those participants who had fallen, 60 % had at least one fall injury.

Table 1: Characteristic of the participants (n=19)

Characteristics	Frequency	Percent
Age (years) Min-Max = 69-94 (Mean=82.84, SD=6.92)		
Gender		
Female	17	89.5
Male	2	10.5
Race/Ethnicity		
Non-Hispanic White	19	100
General health perception		
Fair	2	10.5
Good	4	21.1
Very Good	9	47.4
Excellent	4	21.1
Educational level		
High School	6	31.6
College of Higher	13	68.4
Anxious about financial situation		
Always	1	5.3
Often	2	10.5
Occasionally	4	36.8
Rarely	7	73.7
Never	5	26.3
Who lives with you		
Alone	15	78.9
Partner or Spouse	4	21.1
Family support		
Yes	15	78.9
No	4	21.1

Characteristics	Frequency	Percent
In contact with friends		
Often	17	89.5
Occasionally	2	10.5
Number of falls in past year		
None	14	73.7
At least one	5	26.3
One fall	3	
Two falls	2	
Injuries from falls (n=5)		
None	3	60
Injury	2	40
Received help after falls (n=5)		
No	2	40
Yes	3	60

Fall Risk Assessment using the Subjective Measure (Short Version of FES-I)

Fall risk was assessed by the Short Version of FES-I and the single items of the worry about falling. When asked if the participants were worried about falling, more than half (57.9%) reported having been worried. In addition, more than half (52.6%) of the participants stated that their fear of falling limited their activities. It was found that most of participants were not concerned at all about falling when getting dressed or undressed (94.7%). On the other hand, the activity that was found to produce the most concern was reaching for something above the head or on the ground (57.9%). The second activity that brought up a concern about falling was going up and down stairs (42.1%). Around 32% of participants, felt they were somewhat concerned about falling when taking a shower or a bath. About 16% felt they were somewhat concerned

with falling when getting in or out of the chair. Walking up or down a slope brought concern to almost 32% percent of the participants. Lastly, around 16% felt somewhat concerned when going out to a social event. (Table 2 summarizes Fall risk assessment using the subjective measure of the of the Short Falls Efficacy Scale – International). With these results, a total score was categorized into three groups: low concern, moderate concern and high concern. It was discovered that a majority of participants, fell into the group of low concern for falls (52.6). However, 36.8% had moderate concern for falls and 10.5% of the participants had a high concern of falling.

Table 2: Fall risk assessment using the subjective measure

Questionnaire	Frequency	Percent
Are you worried about falling		
Not at all	8	42.1
A little	5	26.3
Some what	5	26.3
A lot	1	5.3
Does your fear of falling limit your activities		
Not at all	9	47.4
A little	8	42.1
Somewhat	2	10.5
A lot	0	0
Falls Efficacy Score – International Shortened		
Low Concern 7-8	10	52.6
Moderate Concern 9-13	7	36.8
High Concern 14-28	2	10.5
FES-I Total Score Mean = 9.68 SD=2.56, Min=7 Max=15		
Getting dressed or undressed		

Questionnaire	Frequency	Percent
Not at all concerned	18	94.7
Somewhat concerned	1	5.3
Fairly concerned	0	0
Very concerned	0	0
Taking a shower or a bath		
Not at all concerned	13	68.4
Somewhat concerned	6	31.6
Fairly concerned	0	0
Very concerned	0	0
Getting in or out of a chair		
Not at all concerned	15	78.9
Somewhat concerned	3	15.8
Fairly concerned	1	5.3
Very concerned	0	0
Going up or down stairs		
Not at all concerned	11	57.9
Somewhat concerned	6	31.6
Fairly concerned	2	10.5
Very concerned	0	0
Reaching for something above head or on the ground		
Not at all concerned	7	36.8
Somewhat concerned	11	57.9
Fairly concerned	1	5.3
Very concerned	0	0
Questionnaire	Frequency	Percent
Walking or down a slope		
Not at all concerned	11	57.9

Questionnaire	Frequency	Percent
Somewhat concerned	4	21.1
Fairly concerned	2	10.5
Very concerned	1	5.3
Going out to a social event		
Not at all concerned	15	78.9
Somewhat concerned	3	15.8
Fairly concerned	1	5.3
Very concerned	0	0

Fall risk assessment using the objective measure

The BTrackS™ Balance Test (BBT) was performed to assess fall risk as the objective measure. It was found that 36.8% of the participants scored 39-100 resulting in a high risk for falls. More than half of the participants scored in the category of low risk for falls 0-30 (57.9%). BTrackS™ Balance Test score, mean= 33.74, SD= 28.95, Min=13, Max=142.

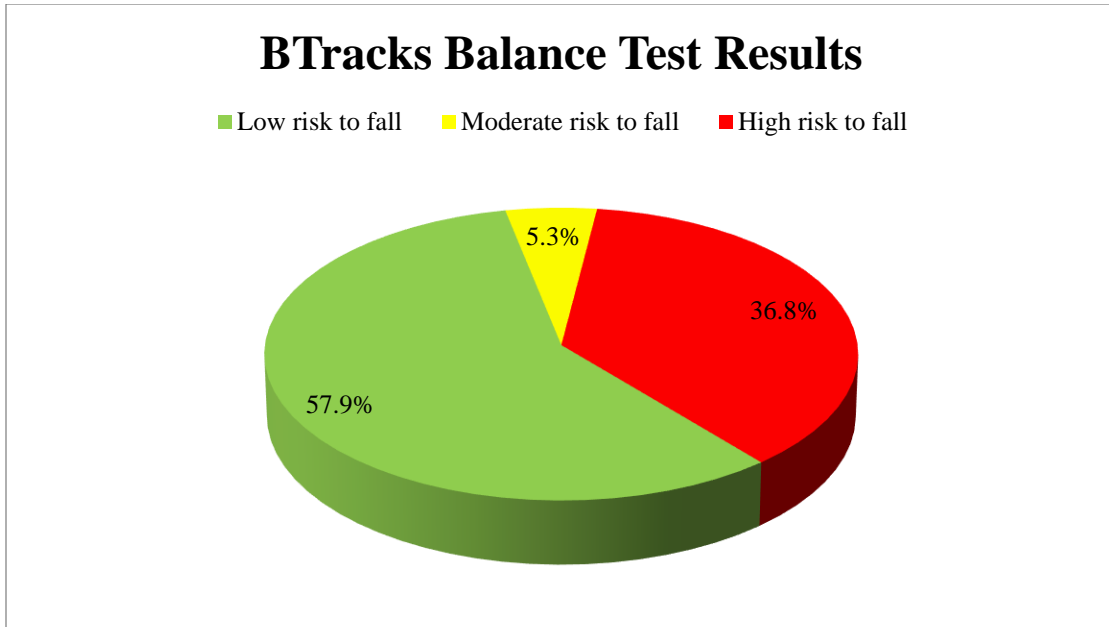


Figure 2: Fall Risk Assessment using the objective measure (BTrackS Balance Test)

Fall Risk Assessment Comparing Between Subjective and Objective Measures.

Six participants of the nineteen participants (31.6%) had incongruent results when compared between subjective and objective measures. Thirteen of the nineteen participants (68.4%) presented congruent results when compared subjective and objective measure (68.4%) as shown in Table 3.

Table 3: Fall risk assessment comparing between subjective and objective measures

Age	Gender	Short FES-I	Concern Level	BTrackS™ Score	Fall Risk	Subjective and Objective Measures
71	Female	7	Low Concern	16	Low Risk	Congruent: Low Risk of Fall
85	Female	7	Low Concern	16	Low Risk	Congruent: Low Risk of Fall
76	Female	7	Low Concern	17	Low Risk	Congruent: Low Risk of Fall
76	Female	7	Low Concern	20	Low Risk	Congruent: Low Risk of Fall
91	Female	7	Low Concern	40	High Risk	Incongruent: Moderate Risk to High Risk of Fall
82	Female	8	Low Concern	13	Low Risk	Congruent: Low Risk of Fall
80	Female	8	Low Concern	17	Low Risk	Congruent: Low Risk of Fall
77	Female	8	Low Concern	35	Moderate Risk	Incongruent: Moderate Risk to High Risk of Fall
84	Male	8	Moderate Concern	45	High Risk	Incongruent: Moderate Risk to High Risk of Fall
87	Female	9	Moderate Concern	24	Low Risk	Incongruent: Moderate Risk to High Risk of Fall
88	Female	9	Moderate Concern	50	High Risk	Incongruent: Moderate Risk to High Risk of Fall
90	Male	9	Moderate Concern	142	High Risk	Incongruent: Moderate Risk to High Risk of Fall
82	Female	11	Moderate Concern	19	Low Risk	Incongruent: Moderate Risk to High Risk of Fall
80	Female	11	Moderate Concern	20	Low Risk	Incongruent: Moderate Risk to High Risk of Fall
64	Female	11	Moderate Concern	39	Moderate Risk	Congruent: Moderate Risk to High Risk of Fall

94	Female	13	Moderate Concern	44	High Risk	Incongruent: Moderate Risk to High Risk of Fall
83	Female	13	Moderate Concern	46	High Risk	Incongruent: Moderate Risk to High Risk of Fall
91	Female	14	High Concern	21	Low Risk	Incongruent: Moderate Risk to High Risk of Fall

Phase 2 Qualitative results

In phase 2, the results were presented into two sections including 1) characteristics of the participants and 2) themes. The goal of phase 2 was to understand older adults' perception on fall risk assessment by the focus group. Table 4 presented the characteristics of participants who participated in the focus group.

Participant 1 was a 91-year-old female who had many falls, resulting in a fractured femur two years ago. After her surgery, she had to stay at a rehabilitation center for months. After assessing her fall risk using subjective and objective measures, she had a low physiological fall risk but high-concerned about falling.

Participant 2 was a 77-year-old female who had a history of osteoporosis and a history of falls. She had been prescribed a balance test from her Internist, but she failed to have the test. After her fall risk assessment using the subjective and objective measures, she had a moderate physiological fall risk and a low concern for falls.

Participant 3 was a 90-year-old male and was legally blind in his left eye. Because he was blind, he felt more aware of his surroundings. He used steel rollator walker, at times to get around. After assessing his fall risk using subjective and objective measures, he had a high physiological fall risk and a moderate concern for falls using the Short FES-I.

Table 4: Characteristics of the participants in focus group

Participant #	Age	Gender	Short FES-I Score	Concern about fall risk	BTrackS™ Score	Fall Risk Level
Participant 1	91	Female	14	High Concern	21	Low Risk
Participant 2	77	Female	8	Low Concern	35	High Risk
Participant 3	90	Male	9	Low Concern	142	High Risk

Themes

Three themes were generated from the qualitative data :1) Perception and experience on fall risk assessment 2) Perception of subjective measure (Short FES-I) and 3) Perception of objective measure (BTrackS™ Balance Test).

Theme 1: Perception and Experience on Fall Risk Assessment

All three participants had no direct experience on fall risk assessments by health care provides. Two participants had history of falls and stated that they know they are risk to fall, after they met with their health care providers because of their health issues including osteoporosis and femur fracture. Two of them also stated that if they fell without any injuries or tripping over, they did not to seek help from healthcare providers. The last participant did not make any comments on experiences of fall risk assessments.

***Participant 1:** “I went to a balance class here when I first came moved in. It was for eight weeks. It taught you how to do this and do that. But fall happened so quick to me, when I broke the femur bone. My reactions were good, but I still fell. I think the other knee gave away. I went up my son’s stairway, turned, and then grabbed on to the banister. But as I turned and for some reason I couldn’t feel the banister and I felt myself fall. I didn’t feel like I broke anything because I didn’t fall that hard, but I did. The old bones gave up. Since then I am very careful, and I watch where I am standing. If I feel like I am a little dizzy getting dressed, I will grab something. I have no problem getting dressed or anything like that and I hold on rail when I shower. I have the rails there to hold on to. So, I am very aware but if I feel anything, I will always grab onto something. But you are afraid of falling, it is just a reaction. You don’t want it to happen again”.*

Participant 2 reported she had a prescription from her Internist to have a balance test done. However, she did not go because at that time, she was busy. When she had time to go, the prescription was expired. She did report that she has tripped over a curb in the parking lot and fell but had no injuries. She reported now being more aware, because she had been diagnosis with osteoporosis.

Participant 2: *“My Internist did a balance test, eight or ten years ago. And she gave me a script to go to a balance rehab. Somewhere around the time, I got around to making an appointment, I was really busy at the time. They said I needed a new script because I had been over six months. So, I never mentioned to my doctor that I never went.... I have fallen inside a home a time or two, stepping off of a chair where I was reaching something. I didn’t realize the distance of the leg and I put down on the first. And down I went. But now I am more aware, especially after the osteoporosis doctor”*

Theme 2: Perception of the Subjective Measure (Short FES-I)

After administering the Short FES-I, during the focus group session the participant 3 who had a moderate concern of falling and reported that he was not concerned about falling in the group discussion. He is legally blind in his left eye and because of this he knows the location of everything.

Participant 3: *“I am not concerned about it, in no shape of form. It doesn’t bother me. I am very. Like in the shower, I know where everything is. And if I sit down I make sure I don’t slide out with soap on your butt.*

When Participant 1 was asked about her concern about falling by using the questionnaire in the Short FES-I, she stated she was somewhat concerned in certain activities, and very concerned in others such as reaching for something above her head. Participant 1 had a fall that resulting in a fractured femur, therefore she reports *“I feels most of the days I feel somewhat concerned.”* On the other hand, Participant 2, said *“Well and I was really wasn’t concerned*

about falling. Because I always say to myself that I am careful, I am not going to fall". All these different perspectives presented that everyone has a different level of concern for falling and it based on their perception on their health status and their potential fall risk. Following this further, when asked about when activity from the Short FES-I that caused the most concern of falling and Participant 1 and Participant 2 stated that it would be reaching for something above their head.

Participant 1: *"Reaching for something above my head. I have a little stool and I am very careful. I hold onto something when I reach"*

Participant 2: *"Well if I had to choose. If I do try to step on a stool, to reach something then "*

However, for the Participant 3, stated that taking a shower was the most concerning activity on the Short FES-I.

Participant 3" *The major thing is taking a shower. Because you soap down and everything. But umm I use. I know where everything is"*

Theme 3: Perception on the Objective Measure (BTrackS™ Balance Test)

All three participants identified that BTrackS™ Balance Test was the useful tool to assess their fall risk. They stated that they were able to see a number, know their fall risk category and inspired them to take care of themselves to prevent falls.

Participant 1" *I thought it was good."*

Participant 2 *"I thought it was good too."*

Participant 3 *"Clever. I don't think I have been in the way of trying to get a number for you and categorize a person. I don't know any other way to do it."*

Participant 1 had a previous femur fracture and because of this she felt like her balance was not good. After discovering her fall risk from the BTrackS™ Balance plate was a low fall risk, she felt good about her score.

Participant 1 *“So I felt pretty good about that. I wasn’t really sure about doing it because I felt I would waste your time and another resident said, no you go anyhow. So, I said I will see where I am at. So, I thought that was pretty good.”*

Participant 2, her fall risk assessment from the BTrackS™ was scored at a moderate risk for falls. She felt inspired by Participant 1. Because participant 1 was older than her but she had a lower fall risk score on the BTrackS™ Balance Plate.

Participant 2: *“Yes because the three of us see the range. I know now I want Female 1 score. So, I know I am going to work it. If she can be low risk I can get myself to be a better risk. So, it is the encouragement and awareness. The perfect score. If you don’t know you aren’t going to do anything. We are going to be better.”*

Phase 3: Integration of the Quantitative and Qualitative Results

There were differences between participant’s perceptions on fall risk assessment (Aim 2) and fall risk assessment using both subjective and objective measures (Aim 1). Participant 1 had a high concern of falling but low physiological fall risk and the combination of subjective and objective measure helped her feel more confident on doing activities of daily living. Participant 2 had a low concern of falling but moderate physiological fall risk, and the group discussion about the BTrackS™ Balance Test results inspired her to be more careful when performing activities of daily living. Participant 3 had moderate concern of falling but high physiological fall risk, and he identified that the BTrackS™ Balance Test is a clever way to asses fall risk.

Table 5: Integrating qualitative and quantitative results

Aim 1: Determine fall risk assessment		
	Subjective Measure	Objective Measure
Participant 1	Short FES-I : 14, High Concern	BTrackS™ Balance Test (BBT): 21, Low Risk
Participant 2	Short FES-I: 8, Low Concern	BTrackS™ Balance Test (BBT): 35, Moderate Risk
Participant 3	Short FES-I: 9, Moderate concern	BTrackS™ Balance Test (BBT): 142, High Risk
Aim 2: Understand older adults' perception on fall risk assessments		
	Data from the Focus Group	
Participant 1	She felt more confident about balance after the assessment objective and subjective measures.	
Participant 2	She was careful when performing activities of daily living and felt inspired by participant 1.	
Participant 3	He had no concerns about falling and stated BTrackS™ Balance Test was a clever way to assess balance.	

DISCUSSION

The purpose of this study was: to determine fall risk assessment using subjective and objective measures, and to understand older adults' perception on fall risk assessment. The findings suggested that in the context of independent living facility, older adults need to have fall risk assessment regularly since 37% of them had a high risk for falls by the objective measure and 47% had moderate to high concern of falling by the subjective measure, similarly to a previous study that 46% of the participants had fear of falling (Strupeit 2016). A recent study conducted in the United States, showed that an activity that caused the most concern for community dwelling older adults was climbing up high to reach something. Most older adults take advantage of tools to get items down from places (Chen, Edwards, & Janke, 2019). The findings with this study are congruent with theirs' in regard to the short FES-I findings. Which found 57.9% participants with a somewhat concern of falling from the Short FES-I. A reason for this concern during this activity may be related to a decrease in vision as well as balance (Chen et al., 2019).

This study presented that approximately 32% had congruent results between subjective, objective measures and 68 % presented incongruent results when compared subjective and objective measure. This is similar to a previous study by Delbaere and colleagues (2010), where 39% of participants had congruence between perceived fall risk and physiological fall risk. About a third of their population had disparities between their perceived fall risk and physiological fall risk (Delbaere, Close, Brodaty, Sachdev, & Lord, 2010) . It is important to consider using both physiological and perceived fall risk (Gunn et al., 2018).

Furthermore, previous research has shown that level of balance relates to a moderate increase on fall risk in community-dwelling older adults (Susan W. Muir et al., 2009).

BTrackS™ Balance Test (BBT) was used in this study as an objective measure of balance. Not only does it assess fall risk based on postural sway, but it can monitor an older adults balance over time in the community (Levy et al., 2018).

Limitations

Several limitations should be notes. First, the pilot study and cross-sectional research design used limits the ability to draw casual inferences with the small sample size. Second, perceived fall risk was assessed using the short FES-I version instead of the full version. Third, the sample population was homogenous with the total sample being non-Hispanic white. Lastly, measurement error may have observed relationships.

Implications for Education and Practice

This study revealed that only one measurement is not likely to capture a whole picture and essential points of fall risk assessment. The results of this study indicate the need for older adults to have access to fall risk assessments or fall risk screenings in their community.

Performing fall risk assessment using both subjective and objective measures is critical for developing fall prevention plans and, to identify those most at risk for falls. Those who have incongruent perceptions of their fall risk and physical abilities are most at risk. In addition, we need to use the combined objective and subjective measures to tailor a specific prevention plan for individual older adult. Moreover, fall assessment should be conducted annually with a reliable objective measure such as the BTrackS™ Balance Test (BBT). The BTrackS™ Balance

Test (BBT) is portable, affordable, provides an instant fall risk assessment report and can show improvement in postural sway or decline.

Implications for Research

Fall injuries can have detrimental consequences including physically and psychological. Future research needs to be conducted using both subjective and objective measures; as well as using both qualitative and quantitative methods. In addition, conducting fall risk assessment in a larger sample size and in diverse population.

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APPENDIX A:
IRB Approval Letter



UNIVERSITY OF CENTRAL FLORIDA

Institutional Review Board
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IRB00001138Office of Research
12201 Research Parkway
Orlando, FL 32826-3246

APPROVAL

February 20, 2019

Dear Ladda Thiamwong:

On 2/20/2019, the IRB reviewed the following submission:

Type of Review:	Modification and Continuing Review
Title:	Fear of falling (FOF) assessment in racial/ethnic older adults (OAs): A mixed-methods study
Investigator:	Ladda Thiamwong
IRB ID:	MODCR00000036
Funding:	None
Grant ID:	None
IND, IDE, or HDE:	None
Documents Reviewed:	<ul style="list-style-type: none"> • Appendix A-B [Ladda Thiamwong].docx, Category: Recruitment Materials; • Protocol IRB 18 13891 (modified Feb 19 2019).docx, Category: IRB Protocol; • Aim 1 Feb 19 2019.pdf, Category: Consent Form; • Aim 2 Feb 19 2019.pdf, Category: Consent Form; • Aim 3 Feb 19 2019.pdf, Category: Consent Form;

The IRB approved the protocol from 2/20/2019 to 2/19/2020.

In conducting this protocol, you are required to follow the requirements listed in the Investigator Manual (HRP-103), which can be found by navigating to the IRB Library within the IRB system.

If you have any questions, please contact the UCF IRB at 407-823-2901 or irb@ucf.edu. Please include your project title and IRB number in all correspondence with this office.

Sincerely,

Adrienne Showman
Designated Reviewer

APPENDIX B:

Data Collection Instrument

Demographic Survey and Short Falls Efficacy Scale International

Name

Phone.....

Demographic Survey

1. How old are you today? _____
2. Gender:
Male or Female
3. Race/ Ethnicity
 African American Asian Hispanic Non- Hispanic – White
4. In general, how good you say your health is?
 Excellent Very good Good Fair Poor
5. Education level
 Lower then 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 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 every sought any help from a doctor or other health care professional following any falls or instability?
 Yes No
15. If no, what stooped you from receiving information?

Short Falls Efficacy Scale International

Short Falls Efficiency Scale International (English)

I would like to ask you 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 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	Getting dressed or undressed				
2	Taking a bath or shower				
3	Going in or out of a chair				
4	Reaching for something above your head or on the ground				
5	Walking up or down a slope				
6	Going up or down stairs				
7	Going out to a social event (e.g. religious service, family gathering or club meeting)				
	Subtotal:				
				Total	/64