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The Activities-Specific Balance Confidence Scale and Its Use in the Stepping on Program to Determine the Relationship Between Balance Confidence and Fall Risk

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THE ACTIVITIES-SPECIFIC BALANCE CONFIDENCE SCALE AND ITS USE IN THE STEPPING ON PROGRAM TO DETERMINE THE RELATIONSHIP BETWEEN BALANCE CONFIDENCE AND FALL RISK

By

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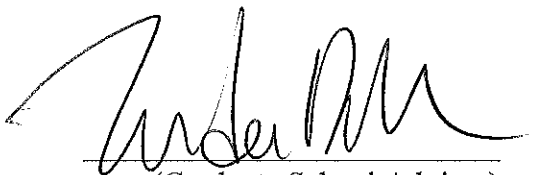
This Scholarly Project, submitted by Erin Yankovec in partial fulfillment of the requirements for the Degree of Doctor of Physical Therapy from the University of North Dakota, has been read by the Faculty Advisor and Chairperson of Physical Therapy under whom the work has been done and is hereby approved.



(Graduate School Advisor)

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Title	The Activities-specific Balance Confidence Scale and its Use in the Stepping On Program to Determine the Relationship Between Balance Confidence and Fall Risk
Department	Physical Therapy
Degree	Doctor of Physical Therapy

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Signature Erin E. Yankaree

Date 10/04/16

TABLE OF CONTENTS

LIST OF TABLES

Table

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ABSTRACT

Introduction: Due to the high incidence of falls in the elderly population, there is a continued need to develop intervention strategies and prevention programs to help reduce the risk of fall related injuries. Stepping On is a 7 week program designed to reduce falls and build confidence in older adults. Participants are educated on balance and strengthening exercises along with information on home hazards, community mobility, safe footwear and equipment, coping, and many other topics to help reduce falls.

Purpose: To determine if group education and exercise classes, like Stepping On, improve balance confidence levels, if balance confidence is correlated to functional ability, and to determine if decreased balance confidence is correlated to increased fall risk.

Methods: Three participants were voluntarily recruited from the program Stepping On. The mean age of the population was 87 years and represented both male and female genders whom were all living at home independently and ambulating in the community. Participants were administered the Activities-specific Balance Confidence (ABC) scale on Week 1 and Week 7 of the Stepping On program along with the CDC Fall Risk Survey, the Stepping On workshop participation evaluation, a survey collecting demographic, mobility, and previous fall history, and the other outcome measures Timed Up and Go (TUG), a modified version of the Four Stage Balance Test (FSBT), and the 30-second Sit to Stand.

Results: Two participants continued the program Stepping On through Week 7. ABC scores from Week 1 to Week 7 suggest no significant change for both participants and both participants reported their balance confidence stayed the same via the Week 7 Stepping On survey. No participant had a fall during the program's duration.

Conclusion: Balance confidence may be related to functional ability, however, further research is needed to determine if decreased balance confidence is related to increased fall risk in older high functioning adult populations who not at a significant risk for falling and are already confident in their balance.

CHAPTER I

INTRODUCTION

Falls are a common problem that many healthcare providers want to address when working with the elderly population. Approximately one-third of elderly individuals will experience a fall within a period of a year with 20 to 60 percent of those falls involving minor to major injuries.[1] This increase in falls risk can be contributed to a variety of factors, including both physical and psychological contributors. Of those, the most common physical factors are gait and balance disorders, impaired visual acuity, personal history factors, and physically debilitating conditions. The most common psychological factors include decreased balance confidence and fear of falling. According to Johnson et al., the latest evidence on the prevention of falls in community dwelling older adults supports the use for group exercise programs and individually tailored multifactorial interventions.[2]

Stepping On is a program proven to reduce falls and build confidence in older adults.[3] The program utilizes strength and balance exercises, along with information on home hazards, community mobility, safe footwear and equipment, coping, and many risk factor modification topics to accomplish this task. (See Appendix A) The class is completed using two hour group sessions once a week, for seven weeks. Stepping On has been found to reduce the risk of falling by 30 percent, as well as increase participants falls confidence by about 20 percent compared to those who did not complete the course,

according to a two year collection of data of community dwelling Stepping On participants with the age 79 as an average.[3]

One study tested the effectiveness of the Stepping On program in reducing falls by conducting a randomized trial of 310 community dwelling older adults with the average age of 78 who had had a fall within the last year or were concerned with falling.[4] The study followed the participants for 14 months total and found that there was a 31 percent reduction of falls. The study concluded that Stepping On is an effective program to prevent falls. It also concluded that cognitive behavioral learning in a group environment can reduce the risk of falling, supporting the use of a group exercise program.

When looking once more at contributing factors to falls, there is research discussing the correlation between physical risk factors, psychological risk factors, and falling. There is also research on which factors are more predictive of future falling. An article published by Landers et al[1] reports that psychological factors may be more predictive of future falls than physical factors. Another study concludes that impairments with balance are commonly present in people with diminished confidence in their balance skills and that having an in-depth understanding of this is important in order to effectively manage those who are at risk for falling.[5] Low balance confidence may also be a risk factor for decline of function in the elderly population, since those with reduced confidence will often not choose to participate in physical activities.

There are many ways to assess balance confidence, but the most standardized way is to complete a survey that can assess how confident an individual is when completing daily activities that could produce a fall. This allows administrators of the survey to give

the individual a score that can be compared to age matched fall risk factors and provide them with a better understanding of the patient's fear of falling and balance confidence levels. Examples of this type of survey include the Activities-specific Balance Confidence Scale (ABC), Falls Efficacy Scale (FES), and the Fear of Falling Avoidance Behavior Questionnaire (FFABQ).

Another way to assess levels of balance confidence is to use a risk of falling checklist. The Center for Disease Control and Prevention (CDC) has a Falls Risk Checklist that highlights activities that could lead to a fall as well as emotions that are linked to falls (See Appendix B). This checklist allows administrators to examine the individual's risk of falls by pointing out the key areas that the patient is struggling with. Knowledge of risk factors is important, according to an article by Brown et al,[6] in order to provide appropriate education and multicomponent fall intervention strategies. Multicomponent risk factor modification strategies may significantly reduce the risk of falling in a population of older adults. According to an article published by Tinetti et al[7] a multiple risk factor intervention strategy will result in a reduction of falling in an elderly population, and therefore supports the implementation of risk factor modification programs like Stepping On. The conclusions from the above articles highlight the importance of analyzing patient confidence and utilizing techniques in group programs, like Stepping On, to improve confidence. It also indicates that there is a need to measure patient confidence before and after programs to determine their effectiveness and if the patient would be at a reduced risk of falling after completion.

The purpose of this study is to primarily determine if balance confidence levels improve through survey reports and the ABC from Week 1 to Week 7 of the program

Stepping On. Secondarily, this study hopes to provide evidence that increased balance confidence is correlated with increased functional ability on the assessments Timed-Up and Go (TUG), a modified version of the Four Stage Balance Test (FSBT), and the 30-Second Sit to Stand. Finally, this study looks to learn whether or not decreased balance confidence is related to an increased fall risk via the CDC fall risk checklist, and both physical and psychological outcome measures.

CHAPTER II

METHODOLOGY

Participants in the study were voluntarily recruited from the program Stepping On. The Stepping On program takes place in the community and is facilitated one time per week for two hour sessions for seven weeks, with a three month follow up. Participants reviewed and signed an informed consent form prior to working with researchers. The study has been approved by the University of North Dakota (UND) Institutional Review Board (IRB) 201209-047 (See Appendix C). Assessments will occur Week 1 and Week 7. These include a CDC fall risk survey, a Stepping On workshop participation evaluation collecting demographic, mobility, and fall information, and the additional balance and confidence outcome measure tests Timed-Up and Go (TUG), Modified Four Stage Balance Test (FSBT), 30 Second Sit-to-Stand, and the Activities-specific Balance Confidence Scale (ABC).

Instrumentation

The Activities-specific Balance Confidence (ABC) Scale is a tool that can be used to assess an individual's level of confidence during common daily activities. It contains 16 items for participants to rate their confidence on and is considered to have a wider continuum of activities than other scales commonly known to assess levels of confidence. The ABC provides test-retest reliability, high internal consistency and validity, and can also correspond to balance performance measures.[8] Lower scores suggest a higher risk

for falls and scores above 80 indicate high confidence and a high level of physical functioning (See Appendix D).

Huang et al[9] took 168 community dwelling older adults with the mean age of 71 administered the Activities-specific Balance Confidence Scale along with other tasks during a home visit. The study concluded that the ABC has high intra and inter rater reliability, as well as a strong correlation with results of physical performance tests looking at balance. However, the authors also report a ceiling effect among non-frail older adults that may lead to initial scores at or above 80 percent to not change at retest even after balance, strengthening, and fear of falling interventions. Another study looked at 475 older adults within a wide range of functional abilities who were involved with the community. The population was given the ABC before and after a community program that was exercise-oriented along with other functional task measures. The average amount of improvement was 24 percent on the ABC with those who demonstrated no significant change having a higher baseline score than those with significant changes.[8] The study also concludes that the best predictors of balance confidence is perceived health, followed by current level of physical activity since perceived importance of routine physical activity and currently being physically active was linked to higher balance confidence.

When comparing the ABC Scale to other confidence measures or surveys it has been suggested that the ABC is more useful for adults who are still active in the community making it a more appropriate assessment for the population of older adults that attend the Stepping On program.[10,11] This is because the inclusion criteria or participation in Stepping On is to be 65 years or older, live on their own, and be able to

walk independently within the community. Another reason the ABC is considered a reliable balance confidence assessment for the population in this study is because the ABC has been shown in evidence to suggest a lower overall score with previous fallers in comparison to their non-faller counterparts.[12] All participants in this study had a previous history of falls. The main reason this test is considered to be more appropriate for the elderly is because it measures both simple and complex tasks when compared to similar scales, like the Falls Efficacy Scale (FES), that measure only simple tasks within the home. Procedures for the ABC were practiced prior to instrumentation of the study to ensure reliability.

Subjects

In order to participate in the study, participants had to be enrolled in the Stepping On program and match the Stepping On inclusion criteria of being 65 years of age or older, living on their own, and being able to walk independently in the community. At the initial session (Week 1), the study took three participants whom all completed the surveys, physical balance assessments, and the Activities-specific Balance Confidence Scale (ABC). The mean age was 87 years. The population represented both male and female genders and were all living at home independently and ambulating in the community without the use of an assistive device. All participants had a history of at least one fall in the last year. Demographics of the three participants are listed in Table 1.

Procedure

This study used the Activities-specific Balance Confidence Scale to determine if participation in the Stepping On program could increase balance confidence and lead to a decreased risk of falls and a lower fear of falling. The questionnaire has a wide range of

Table 1. Characteristics of Participants Week 1 of Stepping On

Subject #	*1*	*2*	*3*
Gender	F	M	F
Age	89	93	81
Types of Assisted Device Used	None	None	SEC
# of Falls Last Year	1	1	5
CDC Fall Risk	5	5	10
Worry About Falling	No	No	Yes
Vision Issues/Type	Yes; Not specified, wears glasses	Yes; Not Specified, wears glasses	Yes; wears glasses, macular degeneration (L)
Level of Activity	Minimally Active	Minimally Active	Minimally Active

activities covering both simple and complex tasks. They range from basic tasks, like moving around the home, to more complex tasks, like walking over icy sidewalks (See Appendix D). Each task is prompted with the statement, "How confident are you that you will not lose your balance or become unsteady when you…" The subject can then respond to the item by rating it on a 0 percent to 100 percent scale, with 0 being no confidence and 100 being completely confident. The scale includes a paragraph for the administrator to use prior to giving the scale that standardizes the instructions for use. It helps explain to the subjects how to complete the survey, as well as how to approach a task that is not a part of the participants' daily activities. This is a common question and it is addressed by saying, "If you do not currently do the activity in question, try and imagine how confident you would be if you had to do the activity." The paragraph also suggest that if the subjects normally use a walking aid to have them complete the scale as if they were using the aid. There is a version of the scale that includes 6 items verses 16, however, the decision was made to use the 16 item scale in order to avoid a ceiling effect

referred to by Huang et al[9] because all subjects were independent at home and in the community.

The ABC for this study was completed one on one with the administrator after completing the additional balance outcome measures, such as the CDC fall risk survey, the Stepping On workshop participation evaluation, the Timed-Up and Go (TUG), Modified Four Stage Balance Test (FSBT), and the 30 Second Sit-to-Stand. The administrator stayed present for questions and the survey was filled out in perspective of having no assistive device since no participant used one at home or in the community. The scale was completed in the same manor at Week 7 that it was at Week 1. The results were then compared along with the fall risk surveys and the other balance outcome measure assessments.

The ABC is easy to use and score. The individual scores of the 16 items are added together and then divided by 16 to produce an average. The max score would result in 1600 points, which divided by 16 would produce a score of 100 percent. If one of the items is not completed, the total score would then be divided by the number of items that were filled out.

Data Analysis

The scores from the Activities-specific Balance Scale from Week 1 were compared to scores from Week 7 to determine effects on balance confidence and fear of falling of the program Stepping On. Improvements and losses in confidence were noted and then compared to improvements and losses in functional ability according to the scores from the other outcome measures Timed-Up and Go (TUG), Modified Four Stage

Balance Test (FSBT), and the 30 Second Sit-to-Stand Week 1 to Week 7 to determine overall effectiveness of Stepping On as a balance prevention intervention.

CHAPTER III

RESULTS

After gathering data from the surveys and The Activities-specific Balance Confidence Scale from both Week 1 and Week 7, changes in balance confidence and fall risk based on participation in the Stepping On program was able to be evaluated. Of the three participants who attended Stepping On Week 1 and completed the surveys, two participants scored above 80 percent on the ABC, representing no risk of falling, and one participant scored at 28 percent representing a significant increased risk of falling. Results from the CDC Fall Risk Survey showed that all three participants scored above four points indicating that all may be at risk of falling. These results compare with Week 7 Stepping On survey in which all participants reported having had at least one fall in the last year.

At Week 7, the Week 7 research survey was distributed along with the Activities-specific Balance Confidence Scale and other outcome measures Timed-Up and Go (TUG), Modified Four Stage Balance Test (FSBT), and the 30 Second Sit-to-Stand once more. Two participants continued attending the Stepping On program. The third participant stopped attending after the first session due to knee pain. The remaining two participants were compliant with their home strength and balance exercises and attended every Stepping On program session. Of the two participants who filled out both the Week 1 and Week 7 surveys, one participant decreased balance confidence by about 3% on the ABC and the other participant increased balance confidence by about 1% on the ABC.

Scores from the ABC, TUG, modified FSBT, and the 30-second Sit to Stand Week 1 and Week 7 are listed in Table 2. Results from these tests and comparisons of Week 1 to Week 7 correspond with the comparisons made between the Week 1 and Week 7 ABC scores. For subject 1, the TUG resulted in a 6% change at a normal pace and a -9% change at a quick pace, the FSBT resulted in 40% change in single leg stance and a 22% change in tandem stance, and the 30-Second Sit to Stand resulted in a 0% change. For subject 2, the TUG resulted in a -18% change at a normal pace and a -12% change at a quick pace, the modified FSBT resulted in -45% change in tandem stance and a 0% change in modified tandem stance, and the 30-Second Sit to Stand resulted in a 0% change.

Both participants completed a Week 7 Stepping On survey on which they answered the questions 'Did balance improve following Stepping On?' and 'Did confidence improve?' One participant reported yes for improved balance and one participated reported it was the same. Both participants reported that their confidence stayed the same. These answers correspond with the changes between Week 1 and Week 7 ABC scale scores, concluding that there is no immediate change in levels of confidence following 7 Weeks of the Stepping On program.

When comparing the scores from the Week 1 and Week 7 ABC surveys, individual changes among the 16 questions were reviewed. Subject 1 reported an improvement in confidence in 6 of the questions and a decrease in confidence in 4 of the questions. Improvements were made in activities like going up and down stairs, bending over to pick an item up, using an escalator with no hand, and all activities that required reaching to a specific distance. Reduced confidence was reported for activities like

getting into and out of a car, going up and down a ramp, being bumped into, and walking on icy sidewalks. Subject 2 reported an improvement in confidence in 5 of the questions and a decrease in confidence in 4 of the questions. Improvements were made in activities like walking around the house, going up and down stairs, getting into and out of a car, being bumped into and using an escalator without hands. Reduced confidence was reported for activities like standing on a chair and reaching, walking across a parking lot, going up and down a ramp, and walking on icy sidewalks.

Table 2. Outcome Measure Scores and Fall Risk Week 1 and Week 7

Outcome Measure	*Week 1* *Subject 1*		*Week 7* *Subject 1*		*Week 1* *Subject 2*		*Week 7* *Subject 2*		*Week 1* *Subject 3*	
ABC	87.5	No Risk	84.4	No Risk	80.6	No Risk	81.3	No Risk	28.1	Risk
TUG	Normal 15.3 sec		Normal 14.3 sec		Normal 11.9 sec		Normal 14.1 sec		Normal 13.1 sec	
	Quick 12.1 sec	Risk	Quick 13.2 sec	Risk	Quick 10.1 sec	No Risk	Quick 11.3 sec	No Risk	Quick 11.3 sec	No Risk
Modified FSBT	SLS 4.4 sec		SLS 6.2 sec		Tandem 12.7 sec		Tandem 6.9 sec		SLS 3.8 sec	
	Tandem 24.5 sec	No Risk	Tandem 30 sec	No Risk	Modified Tandem 30 sec	No Risk	Modified Tandem 30 sec	No Risk	Tandem 3.1 sec	Risk
30-second Sit to Stand	8 reps	No Risk	8 reps	No Risk	9 reps	No Risk	9 reps	No Risk	7 reps	No Risk

CHAPTER IV

DISCUSSION

The minimally clinically important difference (MCID) for the Activities-specific Balance Confidence scale has not yet been established, however, it is known in reference to Huang et al[9] that scores over the percent of 80 indicate a current high confidence and low risk of falling and may suggest a ceiling effect. Since both participants scored above 80 percent on both Week 1 and Week 7, it can be reasoned that neither the decrease nor the increase in the ABC scale results is clinically important for these Stepping On participants. This is because it has been reported that the ceiling effect among non-frail older adults may lead to initial scores at or above 80 percent on the ABC to not change at retest even after balance, strengthening, and fear of falling interventions.

When examining Week 1 and Week 7 ABC surveys and the individual changes among each question, the improvements in confidence reported by Subject 1 may be due to their compliance in completing the strengthening and balance exercises. Increased strength and balance made throughout the seven weeks would lead to improved confidence and ability to walk up and down stairs, bend over to pick items off the ground, and reach for objects at different heights. Items that were reported at reduced levels of confidence may be due to more awareness of the activity hazards. The subject scored less at Week 7 on walking up and down ramps than at Week 1. The Stepping On program Week 6 works on using ramps and techniques to stay safe and prevent falls when walking on them. The subject may have not thought about the needed effort to stay safe on a ramp

previously and thus would score lower Week 7 than Week 1 with this awareness. Another example of increased awareness for Subject 1 and a resultant decrease in confidence would be walking on icy sidewalks. The subject scored themselves with lower confidence on Week 7 for this activity compared to Week 1. Stepping On also covers environmental outdoor hazards that could lead to a fall and teaches techniques to stay safe. Talking about icy sidewalks could have brought extra awareness to the hazards and resulted in a lower score on the ABC for this item. Changes in reported levels of confidence could also be due to different interpretations of the items from Week 1 to Week 7.

The improvements in confidence reported by subject 2 on the ABC survey may be also due to their compliance in completing the strengthening and balance exercises, as well as education on environmental hazards. Like subject 1, increases in confidence were in walking up and down stairs, using the escalator with no hands, being bumped into, etc. These items could have improved because of increased strength and balance following the 7 weeks of Stepping On. This subject also scored higher on the item walking around the house. This may have improved because of education on household hazards and how to change the household to make it safer. Like subject 1, items that were reported at reduced levels of confidence may be due to more awareness of the activity hazards as well as different interpretation of the items Week 1 to Week 7.

Both subjects completed the Timed Up and Go (TUG), a modified version of the Four Stage Balance Test (FSBT), and the 30-Second Sit to Stand at Week 7. The Center for Disease Control and Prevention (CDC) lists normative data for each of these outcome measures in order for administers to rank the participants into either a fall risk category or a no fall risk category. (See Appendix E) Based on these norms and where the two

subjects were ranked at Week 1 and Week 7 there was no change in fall risk categories even with some changes in percentage Week 1 to Week 7 of the outcome measures. This compares to results of the ABC Week 1 to Week 7. Because of this, it may be concluded that functional ability and fall risk relates to balance confidence. However, further investigation is needed for studies in which the participants produce a change in functional ability and balance confidence to determine whether the two variables are directly correlated to each other.

Limitations

This study's limitations were an overall small population size, an average subject age that was higher than referenced normative data, and an average subject age that was higher than the referenced research studies looking at balance confidence and fall risk. There was also an initial ceiling effect on the ABC predisposing the subjects to follow up with little change according to Huang et al.[9] Other limitations of this study may be the subjects' different interpretations of the questions from Week 1 to Week 7 and the small amount of time between the initial and final session and implementation of the physical and psychological outcome measures.

Recommendations

Strengths of this study include our ability to provide a closer evaluation of the subjects, due to the small population size, as well as the subject compliance in completing the weekly exercises at home. Recommendations for future studies similar to this include extending the length of time from first evaluation to final evaluation for patients of a higher average age level to determine if this population can still improve balance and balance confidence given more time to work on their exercises and modify their

environment. According to Kloos et al[13], current best evidence suggests that in order to reduce the risk of falls and increase balance an exercise program should devote at least 50 hours to the exercise and activities. Sherrington et al[14] supports this evidence by stating that a higher dose of exercise, either 2 times per week for 25 weeks or 4 times per week for 12 weeks, can produce greater effects. It may also be beneficial to utilize another form of the ABC scale that reduces the effect of different interpretations over time of the 16 ABC items. An article published by Filiatrault et al[15] proposed an amendment to the ABC. The authors suggest that the ABC may show more validity and reliability for high functioning community-dwelling older adults if the cue question was reformatted and the item on icy sidewalks was removed. The new format is reportedly more user-friendly and more congruent with public health falls prevention strategies. The revised scale is designated as the Activities-specific Balance Confidence-Simplified (ABC-S) scale. Utilizing this form of the ABC may be more beneficial for older high functioning populations like the population in this study. Other recommendations are to incorporate subjects who, at initial evaluation, are categorized into the fall risk group in order to determine if a group balance prevention class like Stepping On can improve their confidence and decrease their fall risk.

Conclusion

Primarily, higher functioning older adult populations who are not at a significant fall risk, according to the Activities-specific Balance Confidence Scale and the functional outcome measures Timed-Up and Go (TUG), a modified version of the Four Stage Balance Test (FSBT), and the 30-Second Sit to Stand, and who are confident in their balance may not improve their balance confidence levels from Week 1 to Week 7 of

Stepping On. Secondly, balance confidence may be related to functional ability determined by the assessments TUG, FSBT, and the 30-Second Sit to Stand, however further research is needed to determine this relationship in full and whether or not decreased balance confidence is related to increased fall risk via both physical and psychological outcome measures. Finally, according to the data collected from this study's participants, it cannot be concluded that decreased balance confidence is related to an increased fall risk via the CDC fall risk checklist.

APPENDIX A

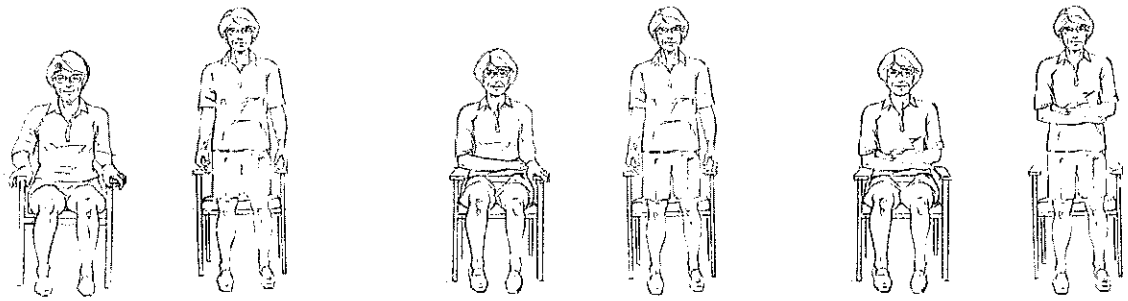
Stepping On Exercises

Exercises at a glance

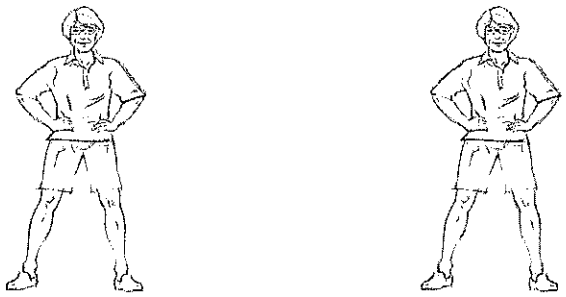
BALANCE EXERCISES

For more specific instructions on advancing each exercise, refer back to the manual.

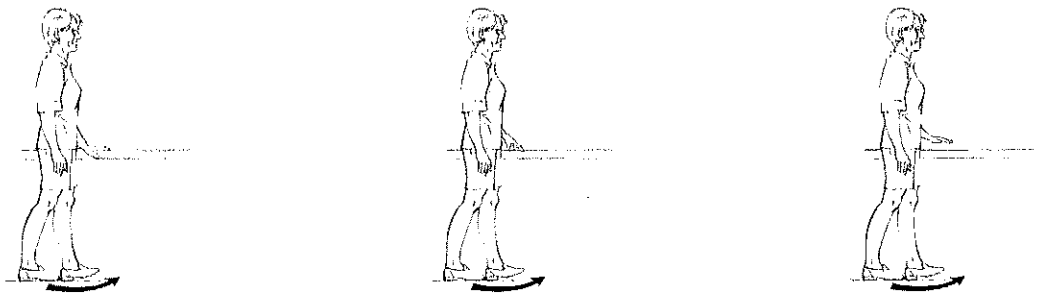
Sit-to-stand



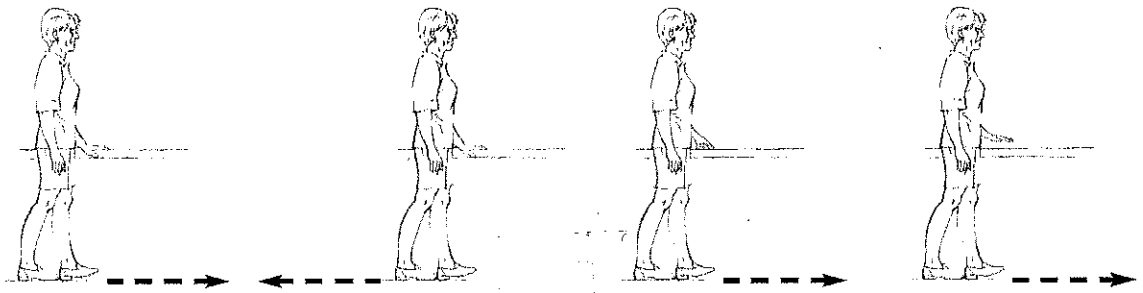
Sideways walking



Heel-toe (tandem) standing



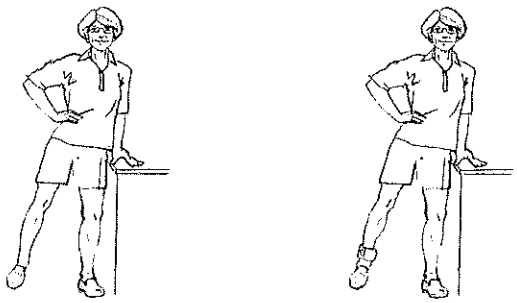
Heel-toe (tandem) walking



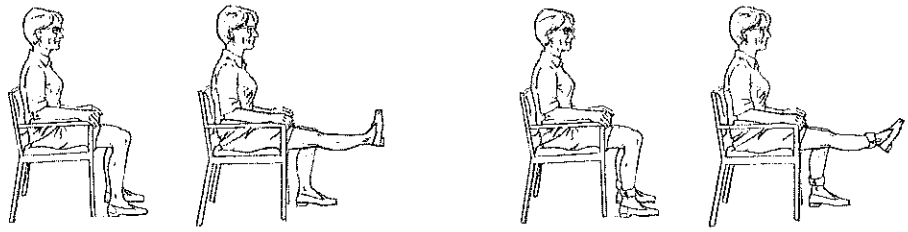
Strength Exercises

For more specific instructions on advancing each exercise, refer back to the manual.

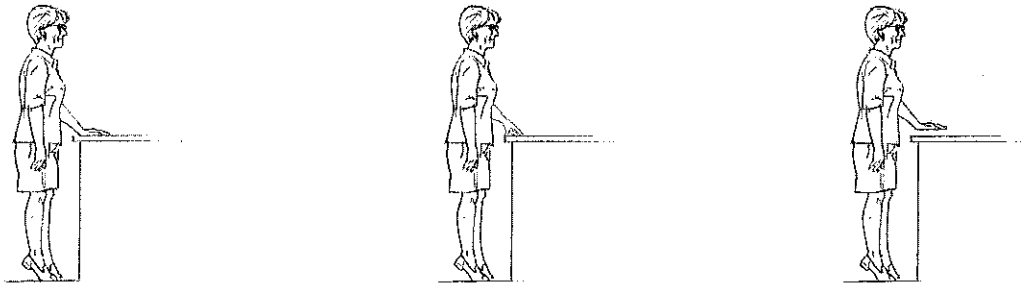
Side-hip-strengthening



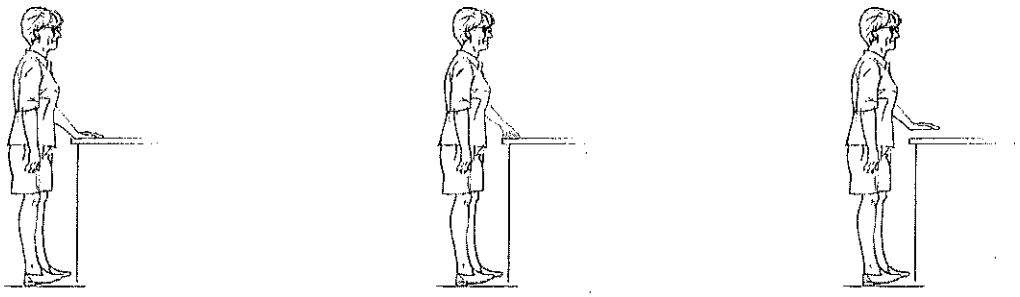
Front-knee-strengthening



Heel raises



Toe raises



APPENDIX B

Fall Risk Checklist

Stepping On – Week 1
Fall Risk Checklist (CDC)

Name _____ Age _____ Date _____

Please Circle **"Yes" or "No"** for each statement below. **( )** indicates # of points .

Yes (**2**) or No (0) I have fallen in the past year. If yes, how many times? _____

Yes (**2**) or No (0) I use or have been advised to use a cane or walker to get around safely.
*If yes, what assistive device do you use most often?

Yes (1) or No (0) Sometimes I feel unsteady when I am walking.

Yes (1) or No (0) I steady myself by holding onto furniture when walking at home.

Yes (1) or No (0) I am worried about falling.

Yes (1) or No (0) I need to push with my hands to stand up from a chair.

Yes (1) or No (0) I have some trouble stepping up onto a curb.

Yes (1) or No (0) I often have to rush to the toilet.

Yes (1) or No (0) I have lost some feeling in my feet.

Yes (1) or No (0) I take medicine that sometimes makes me feel light-headed or more tired than usual.
*How many prescription medicines do you take per day? ____

Yes (1) or No (0) I take medicine to help me sleep or improve my mood.

Yes (1) or No (0) I often feel sad or depressed.

TOTAL _____ Add up the number of points for each "yes" answer. *If you scored 4 points or more, you may be at risk for falling.*

Check Your Risk for Falling

Please circle "Yes" or "No" for each statement below.			Why it matters
Yes (2)	No (0)	I have fallen in the past year.	People who have fallen once are likely to fall again.
Yes (2)	No (0)	I use or have been advised to use a cane or walker to get around safely.	People who have been advised to use a cane or walker may already be more likely to fall.
Yes (1)	No (0)	Sometimes I feel unsteady when I am walking.	Unsteadiness or needing support while walking are signs of poor balance.
Yes (1)	No (0)	I steady myself by holding onto furniture when walking at home.	This is also a sign of poor balance.
Yes (1)	No (0)	I am worried about falling.	People who are worried about falling are more likely to fall.
Yes (1)	No (0)	I need to push with my hands to stand up from a chair.	This is a sign of weak leg muscles, a major reason for falling.
Yes (1)	No (0)	I have some trouble stepping up onto a curb.	This is also a sign of weak leg muscles.
Yes (1)	No (0)	I often have to rush to the toilet.	Rushing to the bathroom, especially at night, increases your chance of falling.
Yes (1)	No (0)	I have lost some feeling in my feet.	Numbness in your feet can cause stumbles and lead to falls.
Yes (1)	No (0)	I take medicine that sometimes makes me feel light-headed or more tired than usual.	Side effects from medicines can sometimes increase your chance of falling.
Yes (1)	No (0)	I take medicine to help me sleep or improve my mood.	These medicines can sometimes increase your chance of falling.
Yes (1)	No (0)	I often feel sad or depressed.	Symptoms of depression, such as not feeling well or feeling slowed down, are linked to falls.
Total_____		Add up the number of points for each "yes" answer. If you scored 4 points or more, you may be at risk for falling. Discuss this brochure with your doctor.	

*This checklist was developed by the Greater Los Angeles VA Geriatric Research Education Clinical Center and affiliates and is a validated fall risk self-assessment tool (Rubenstein et al. J Safety Res; 2011;42(6)493-499). Adapted with permission of the authors.

Your doctor may suggest:

- Having other medical tests
- Changing your medicines
- Consulting a specialist
- Seeing a physical therapist
- Attending a fall prevention program

APPENDIX C

IRB, Consent Forms, Participant Surveys

Research Project Review and Progress Report

University of North Dakota Institutional Review Board

DATE: 2/26/2016 **DEPARTMENT:** Physical Therapy

PRINCIPAL INVESTIGATOR: Danks, Meridee; Johnson, Beverly

PROJECT TITLE: The Effectiveness of the "Stepping On" Program for Reducing the Incidence of Falls in the Elderly

PROPOSAL NUMBER: IRB-201209-047

IF MEDICAL COMPONENT, PLEASE GIVE PHYSICIAN'S NAME:

IRB USE ONLY

☐ FULL BOARD REVIEW REQUIRED, EVEN THOUGH ORIGINAL APPROVAL WAS EXPEDITED

☑ CONTINUED APPROVAL, "EXPEDITED" CATEGORY 4, 7

☑ NEXT REVIEW REQUIRED BEFORE: APR 4 2017

☐ CONTINUED APPROVAL, BASED ON FULL BOARD REVIEW

☐ NEXT REVIEW REQUIRED BEFORE:

☐ SUSPEND APPROVAL, PENDING INVESTIGATION

☐ APPROVAL TERMINATED

COMMENTS OF REVIEWER:

Signature of Chair/Vice Chair or Designee:

cc: Chair, Physical Therapy Approval Date: 4.5.16

1. Is project complete? Yes ☐ No ☒

2. Is project ongoing? Yes ☒ No ☐

If No, explain below and indicate if continued approval and continuing review is desired.

3. How many subjects have been enrolled in the research project?

14 since the date of last approval, and

34 since the initial approval

4. Is the research permanently closed to the enrollment of new subjects? Yes ☐ No ☒

Have all subjects completed all research-related interventions? Yes ☐ No ☒

Does the research remain active only for long-term follow-up of subjects? Yes ☐ No ☒

5. Is data analysis complete? Yes ☐ No ☒

*** If the research is permanently closed to the enrollment of new subjects, all subjects have completed all research-related interventions, the research does not need to remain active for long-term follow-up of subjects, and all data analysis is complete, please sign here that you would like the IRB to terminate approval for this project, and finish filling out the rest of this form.

Please terminate IRB approval for this research project

Signature of Principal Investigator Date

INFORMED CONSENT

TITLE:	**The Effectiveness of the "Stepping On" Program for Reducing the Incidence of Falls in the Elderly**
PROJECT DIRECTOR:	**Meridee Danks and Beverly Johnson**
PHONE #	**701-777-2831**
DEPARTMENT:	**Physical Therapy**

STATEMENT OF RESEARCH

A person who is to participate in the research must give his or her informed consent to such participation. This consent must be based on an understanding of the nature and risks of the research. This document provides information that is important for this understanding. Research projects include only subjects who choose to take part. Please take your time in making your decision as to whether to participate. If you have questions at any time, please ask.

WHAT IS THE PURPOSE OF THIS STUDY?

You are invited to be in a research study that will look at the effectiveness of education and exercise in reducing falls. You have been identified as a possible subject as you are presently participating in the "Stepping On" program. The purpose of this research study is to test whether the Stepping On program is effective in reducing falls in older people living at home. Participants need to be 65 or older, live in on their own, and be able to walk independently in the community.

HOW MANY PEOPLE WILL PARTICIPATE?

Approximately 10-12 people at each site will take part in this study being performed by University of North Dakota Department of Physical Therapy.

HOW LONG WILL I BE IN THIS STUDY?

Your participation in the study will last the same length of time you will be in the Stepping On program (7 weeks with a 3 & 6-month follow-up). The assessment times will be at the same days as when you will be attending your Stepping On program. Each visit will take about ***20*** minutes during the Day 1, Day 7, 3-month & 6-month recheck of the Stepping On program.

Date_____
Subject Initials:_____

WHAT WILL HAPPEN DURING THIS STUDY?

Assessments will occur at Week 1 and 7 sessions and then at 3 month booster session and at 6 month recheck at the same site. Assessment will include the following:

1. Baseline Questionnaire and Fall Risk Survey - are filled out as part of the Stepping On program. Questionnaire is to gather demographic, mobility and fall information. You are free to skip any questions that you prefer not to answer. Time to complete is ~10 minutes.

Additional test performed (beyond Stepping On gathered information), include:

2. Activities-specific Balance Confidence (ABC) Scale - subject rates level of confidence in doing everyday activities with out falling using a 0 – 100% scale (0 = no confidence to 100 = completely confident). Total score is sum of 16 individual activity scores, which is than averaged, the higher the score the less concerns the subject has about falling. Time to complete is less than 5 minutes.

3. Sit to Stand Test (STS) - the subject will be asked to go from a sit to stand for 30 seconds. The number of repetitions will be completed in 30 sec and the length of time to complete the first 5 sit to stands will be recorded. This is an objective measurement of strength and balance. Time to complete ~ 3 minutes.

4. Timed Up and Go Test (TUG) - the test requires that subjects stand up from a chair, walk 10 ft, turn around, and return. The time to complete the activity is recorded. A second trial will be performed with the subject perfoming a cognitive task (i.e. subtracting by 3s or spelling words) while walking. A safety belt will be used when performing the assessment. Time to complete is 1 minute. This is an objective measure of balance in an activity of daily function. If available, the GAITRite electronic walkway may be used to allow the researchers to gather greater data on subjects walking parameters during the 10 meter walk.

5. Four-Test Balance Scale – This is a four part balance test, each part progressively challenges a person balance. The subject first will try to balance for 10 seconds with feet together, then with feet together but one slightly ahead of the other, progressing to one foot in front of the other (heel-toe) and lastly, the subject stands on one leg for up to 30 seconds with eyes open. If subject is unable to stand for the alotted time for any part the test will be stopped. A safety belt will be used during this assessment. Time to complete is 3-5 minutes. This is an objective measure of balance and strength.

6. Fall and Activity Survey and Stepping On Participation Evaluation - each subject will be given the 2 survey's following the completion of Stepping On session at Week 7, at 3-month Booster session and at the 6 months recheck to record any falls that have occurred and to monitor follow through of assigned strength and balance exercises. Fall is defined as an event that results in a person unintentionally coming to rest on the ground, floor, or

Date_____
Subject Initials:_____

other lower level. (Buchner) If a subject is unable to attend the Booster session and/or at the 6-month recheck they will be contacted by phone or mail in regards to the survey.

WHAT ARE THE RISKS OF THE STUDY?

There may be some risk from being in this study, mainly with the potential to lose your balance. This risk will be minimized by use of safety precautions. For each physical balance assessment a safety belt and spotter will be used to prevent any falls. You can decide not to perform any assessment that you do not feel comfortable/safe performing.

WHAT ARE THE BENEFITS OF THIS STUDY?

You benefit personally from being in this study. However, we hope that, in the future, other people might benefit from this study because it may help identify benefits of prevention education and exercise on falls in the elderly population. You may benefit by knowing your balance strengths and weakness that will be identified by the assessment scores.

ALTERNATIVES TO PARTICIPATING IN THIS STUDY

You can decide to participant only in the Stepping On program and not in the research study.

WILL IT COST ME ANYTHING TO BE IN THIS STUDY?

You will not have any costs for being in this research study. Nor will you be paid for being in this research study.

WHO IS FUNDING THE STUDY?

The University of North Dakota and the research team are receiving no payments from other agencies, organizations, or companies to conduct this research study.

CONFIDENTIALITY

The records of this study will be kept private to the extent permitted by law. In any report about this study that might be published, you will not be identified. Your study record may be reviewed by Government agencies, the UND Research Development and Compliance office, and the University of North Dakota Institutional Review Board Any information that is obtained in this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law. Confidentiality will be maintained by means of assigning you an identification number that will be used instead of your name on any data that is kept. Your signed consent form and your data will be stored separately in a locked room. Only the researchers will have access to any identifiable information. If we write a report or article about

Date_____
Subject Initials:_____

this study, we will describe the study results in a summarized manner so that you cannot be identified.

IS THIS STUDY VOLUNTARY?

Your participation is voluntary. You may choose not to participate or you may discontinue your participation at any time without penalty or loss of benefits to which you are otherwise entitled. Your decision whether or not to participate will not affect your current or future relations with the University of North Dakota or the Stepping On program

CONTACTS AND QUESTIONS?

The researchers conducting this study are Meridee Danks and Beverly Johnson. You may ask any questions you have now. If you later have questions, concerns, or complaints about the research please contact **Meridee Danks or Beverly Johnson at 701-777-2831** during the day.

If you have questions regarding your rights as a research subject, or if you have any concerns or complaints about the research, you may contact the **University of North Dakota Institutional Review Board at (701) 777-4279**. Please call this number if you cannot reach research staff, or you wish to talk with someone else.

Your signature indicates that this research study has been explained to you, that your questions have been answered, and that you agree to take part in this study. You will receive a copy of this form.

Subjects Name: (Print) _____

_____ _____

Signature of Subject Date

I have discussed the above points with the subject or, where appropriate, with the subject's legally authorized representative.

_____ _____

Signature of Person Who Obtained Consent Date

pproval Date: MAY 11 2015
Expiration Date: MAY 10 2016
University of North Dakota IRB

Date_____
Subject Initials: _____

Stepping On Baseline Questionnaire – Week 1

Yes or No Do you have any vision impairments? (glasses, macular degeneration, glaucoma, etc.)

*If yes, what kind?

Yes or No Have you had any surgeries in the last year? (hip, knee, etc.)

*If yes, what kind?

Yes or No Have you had any major health issues in the past year?

*If yes, briefly describe.

Yes or No Do you have difficulty with walking or balance?

Yes or No Do you exercise regularly (3x/week or more)?

*If yes, what type of exercise & how often do you perform it?

*How would you rate your level of physical activity on a typical day? (circle one)

Inactive Minimally Active Moderately Active Highly Active

Date _____ Name _____

Stepping On Survey – Week 7

1. Do you feel your balance and confidence have improved while performing daily activities as a result of participating in the Stepping On Program?

   Balance Yes _____ No _____

   Confidence Yes _____ No _____

   If yes, what information helped you the most?

2. A fall is any event that led to an unplanned, unexpected contact with a supporting surface such as the floor. Have you fallen since starting the Stepping On Program?

   Yes _____ No_____ If yes, how many falls since the program began: _____

   Describe the cause of fall(s) and any injuries that occurred:

3. How would you rate your present level of daily physical activity? (circle one)

   Inactive/Low **Moderate** **High**

   If your physical activity is limited, what do you think is the major reason?

4. Have you performed the Stepping On exercises faithfully?

   Yes___No___

   If no, what has kept you from performing the exercises as per the recommended amount of times?

If yes, record on the chart below how often each week you perform the Stepping On exercises, the number of repetitions you do of each exercise, and the amount of weight you use with the strength exercises?

Balance Exercises:

	# times/week	# of repetitions
Sit-to-Stand		
Sideways Walking		
Heel-toe standing		
Heel-toe walking		

Strength Exercises:

	# times/week	# of reps & weight
Side-hip-strengthening		
Knee-strengthening		
Heel raises		
Toe raises		

5. Do you have any difficulties performing the above exercises?

Yes _____ No _____ If yes, describe what difficulties you are having?

6. Had you been actively exercising at home prior to the Stepping On program?

Yes ____ No ____ If yes, what type of exercise did this include?

How frequently do you perform these? _____

7. Do you participate in community exercise groups (other than Stepping On program)?

Yes ____ No ____ If yes, what group and/or type of exercise?

How often do you attend? _____

Date _____ ID # _____

Stepping On Survey – 3 months after

1. Do you feel your balance and confidence have improved while performing daily activities as a result of participating in the Stepping On Program?

   Balance Yes___ No___

   Confidence Yes___ No___ If yes, what strategies have helped you?

2. Do you feel that the Stepping On Program has helped you?

   Yes___ No___ If yes, how has it helped you?

3. Have you had any falls since completing the Stepping On Program?

   Yes___ No___ If yes, how many falls:_____
   What was the cause(s) of the fall(s)?

4. How often do you perform the Stepping On exercises usually? (Circle below)

   Strength: ≥3x/week 2x/week 1x/week < than 1x/week Not at all

   Balance: ≥3x/week 2x/week 1x/week < than 1x/week Not at all

   If you have not been doing the exercises regularly, what has kept you from doing so?

5. Have you joined or continued any community exercise groups since the Program?

   Yes___ No___ If yes, what group?

APPENDIX D

Activity-specific Balance Confidence Scale

Name _____

The Activities-specific Balance Confidence (ABC) Scale*

For each of the following activities, please indicate your level of self-confidence by circling a corresponding number from the following rating scale:

0% 10 20 30 40 50 60 70 80 90 100%
no confidence completely confident

"How confident are you that you will not lose your balance or become unsteady when you..."

1. ...walk around the house?

0% 10 20 30 40 50 60 70 80 90 100%
no confidence completely confident

2. ...walk up or down stairs?

0% 10 20 30 40 50 60 70 80 90 100%
no confidence completely confident

. ...bend over and pick up a slipper from the front of a closet floor?

0% 10 20 30 40 50 60 70 80 90 100%
no confidence completely confident

4. ...reach for a small can off a shelf at eye level?

0% 10 20 30 40 50 60 70 80 90 100%
no confidence completely confident

5. ...stand on your tiptoes and reach for something above your head?

0% 10 20 30 40 50 60 70 80 90 100%
no confidence completely confident

6. ...stand on a chair and reach for something?

0% 10 20 30 40 50 60 70 80 90 100%
no confidence completely confident

...sweep the floor?

0% 10 20 30 40 50 60 70 80 90 100%
no confidence completely confident

See pg 2 →

8. ...walk outside the house to a car parked in the driveway?

0% 10 20 30 40 50 60 70 80 90 100%
no confidence completely confident

9. ...get into or out of a car?

0% 10 20 30 40 50 60 70 80 90 100%
no confidence completely confident

10. ...walk across a parking lot to the mall?

0% 10 20 30 40 50 60 70 80 90 100%
no confidence completely confident

11. ...walk up or down a ramp?

0% 10 20 30 40 50 60 70 80 90 100%
no confidence completely confident

12. ...walk in a crowded mall where people rapidly walk past you?

0% 10 20 30 40 50 60 70 80 90 100%
no confidence completely confident

13. ...are bumped into by people as you walk through the mall?

0% 10 20 30 40 50 60 70 80 90 100%
no confidence completely confident

14. ... step onto or off an escalator while you are holding onto a railing?

0% 10 20 30 40 50 60 70 80 90 100%
no confidence completely confident

15. ... step onto or off an escalator while holding onto parcels such that you cannot hold onto the railing?

0% 10 20 30 40 50 60 70 80 90 100%
no confidence completely confident

16. ...walk outside on icy sidewalks?

0% 10 20 30 40 50 60 70 80 90 100%
no confidence completely confident

*Powell, LE & Myers AM. The Activities-specific Balance Confidence (ABC) Scale. *J Gerontol Med Sci* 1995; 50(1): M28-34

APPENDIX E

CDC Outcome Measure Instructions

Patient: Date: Time: AM/PM

The Timed Up and Go (TUG) Test

Purpose: To assess mobility

Equipment: A stopwatch

Directions: Patients wear their regular footwear and can use a walking aid if needed. Begin by having the patient sit back in a standard arm chair and identify a line 3 meters or 10 feet away on the floor.

Instructions to the patient:

When I say **"Go,"** I want you to:

1. Stand up from the chair
2. Walk to the line on the floor at your normal pace
3. Turn
4. Walk back to the chair at your normal pace
5. Sit down again

On the word **"Go"** begin timing.

Stop timing after patient has sat back down and record.

Time: _____ seconds

An older adult who takes ≥12 seconds to complete the TUG is at high risk for falling.

Observe the patient's postural stability, gait, stride length, and sway.

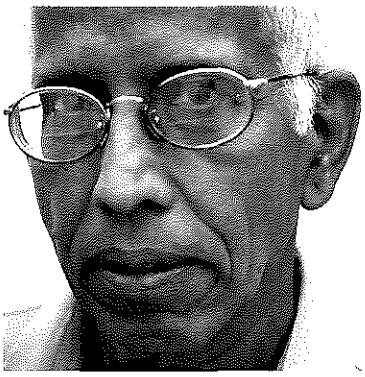
Circle all that apply: Slow tentative pace ■ Loss of balance ■ Short strides ■ Little or no arm swing ■ Steadying self on walls ■ Shuffling ■ En bloc turning ■ Not using assistive device properly

Notes:

For relevant articles, go to: **www.cdc.gov/injury/STEADI**

Patient: Date: Time: AM/PM

The 4-Stage Balance Test



Purpose: To assess static balance

Equipment: A stopwatch

Directions: There are four progressively more challenging positions. Patients should not use an assistive device (cane or walker) and keep their eyes open.

Describe and demonstrate each position. Stand next to the patient, hold his/her arm and help them assume the correct foot position.

When the patient is steady, let go, but remain ready to catch the patient if he/she should lose their balance.

If the patient can hold a position for 10 seconds without moving his/her feet or needing support, go on to the next position.
If not, stop the test.

Instructions to the patient: I'm going to show you four positions.

Try to stand in each position for 10 seconds. You can hold your arms out or move your body to help keep your balance but don't move your feet. Hold this position until I tell you to stop.

For each stage, say "**Ready, begin**" and begin timing.

After 10 seconds, say "**Stop.**"

See next page for detailed patient instructions and illustrations of the four positions.

For relevant articles, go to: **www.cdc.gov/injury/STEADI**

Instructions to the patient:

1. Stand with your feet side by side. **Time:** _____ **seconds**

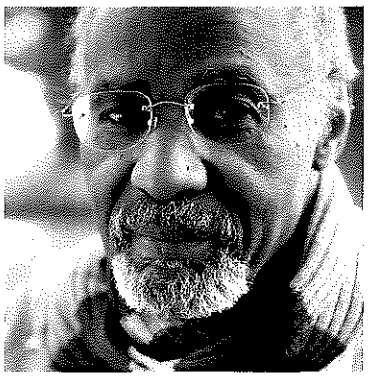
2. Place the instep of one foot so it is touching the big toe of the other foot. **Time:** _____ **seconds**

3. Place one foot in front of the other, heel touching toe. **Time:** _____ **seconds**

4. Stand on one foot. **Time:** _____ **seconds**

An older adult who cannot hold the tandem stance for at least 10 seconds is at increased risk of falling.

Notes:



Patient: Date: Time: AM/PM

The 30-Second Chair Stand Test

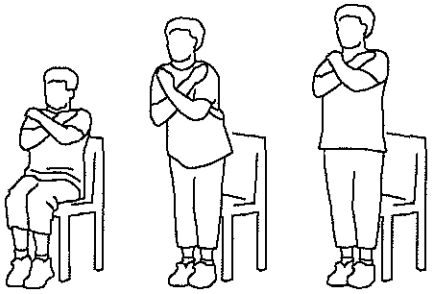
Purpose: To test leg strength and endurance

Equipment:

- A chair with a straight back without arm rests (seat 17" high)
- A stopwatch

Instructions to the patient:

1. Sit in the middle of the chair.
2. Place your hands on the opposite shoulder crossed at the wrists.
3. Keep your feet flat on the floor.
4. Keep your back straight and keep your arms against your chest.
5. On **"Go,"** rise to a full standing position and then sit back down again.
6. Repeat this for 30 seconds.



On **"Go,"** begin timing.

If the patient must use his/her arms to stand, stop the test. Record "0" for the number and score.

Count the number of times the patient comes to a full standing position in 30 seconds.

If the patient is over halfway to a standing position when 30 seconds have elapsed, count it as a stand.

Record the number of times the patient stands in 30 seconds.

Number: _____ **Score** _____ **See next page.**

A below average score indicates a high risk for falls.

Notes:

For relevant articles, go to: **www.cdc.gov/injury/STEADI**

Chair Stand—Below Average Scores

Age	Men	Women
60-64	< 14	< 12
65-69	< 12	< 11
70-74	< 12	< 10
75-79	< 11	< 10
80-84	< 10	< 9
85-89	< 8	< 8
90-94	< 7	< 4

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