

**Northern Illinois University**

**Will Two Different Tests for High Fall Risk Both Come to the Same Conclusion?**

**A Thesis Submitted to the**

**University Honors Program**

**In Partial Fulfillment of the**

**Requirements of the Baccalaureate Degree**

**With University Honors**

**Department of**

**Allied Health and Communicative Disorders**

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**May 12, 2012**

University Honors Program

Capstone Approval Page

Capstone Title: (print or type):

Will Two Different Tests for High Fall Risk  
Both Come to the Same Conclusion?

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Date of Approval (print or type):

February 24, 2012

## Honors Thesis Abstract

For my project, I looked at data from two different tests, both of which determine whether a person is a fall risk. I was trying to find out if both tests would come to the same conclusion. The data that I used contained males and females aged anywhere from 55 years old to 90 years old. I compared the two tests between the males, the females, and then each data set as a whole. I did this by comparing the average scores from the males, the females, and each data set, to see if there were any differences in the results. My end result was that even though both tests look at whether or not a person is a fall risk, the results were different.

HONORS THESIS ABSTRACT  
THESIS SUBMISSION FORM

AUTHOR: Stephanie Harr

THESIS TITLE: Will Two Different Tests for High Fall Risks Both  
Come to the Same Conclusion?

ADVISOR: Dr. MJ Blaschak

ADVISOR'S DEPT: Physical Therapy

DISCIPLINE: Pre-Physical Therapy

YEAR: 2012

PAGE LENGTH: Nine pages

BIBLIOGRAPHY: Refer to end of paper

ILLUSTRATED: No.

PUBLISHED (YES OR  NO):

LIST PUBLICATION: N/A

COPIES AVAILABLE (HARD COPY, MICROFILM, DISKETTE): 1

ABSTRACT (100 - 200 WORDS): 125

In math, there are numerous different ways to get a total of twenty. One could use addition, subtraction, multiplication, division, or numerous combinations of them. This is also the case in physical therapy when determining if a patient is a fall risk or not. For this project I am going to focus on two specific tests. I will be focusing on the dynamic gait index test and the timed up and go test. These two tests are very different from one another, but both can be used to determine if someone is a fall risk or not. For this project I will give background information on both tests, gather data on both tests, do some math on the data that I gather and then see how the test results differ from each other. The information that was gathered was obtained from two different outpatient clinic settings. A copy of each test will be included at the end of the paper.

First I will give some background information on the dynamic gait index test. This test consists of eight different tasks. Each task can be given a score of a 0, 1, 2, or 3. A score of zero means severe impairment, a score of one means moderate impairment, a score of two means mild impairment, while a score of three means normal or no impairment. The highest possible score on this test is a 24. In order for someone to be considered as a fall risk, one has to score less than a 19. As previously mentioned, there are eight tasks that make up this test. These tasks are as follows: walk from one point to another, walk at a normal pace then as fast as possible and then as slow as possible, walk straight while looking ahead then walking straight looking right then left then back to the center, walk straight looking ahead and then looking up and down and returning to the center, walk forward then as fast as possible and turn in a half circle then stop, walk forward and step over the obstacle and keep walking, walk forward and walk to the right of the first obstacle then walk to the left of the second obstacle, and walk up the stairs turn around and walk down them. The most common patients that this test is done on are geriatrics, people who have vestibular disorders, multiple sclerosis, Parkinson's disease, or people who have had a

stroke. For this project, I am really only concerned with the older patients. This test has been studied for test-retest reliability and validity for all the different types of patients tested and received anywhere from adequate to excellent scores, except for one poor from people with vestibular disorders specifically oscillopsia.

I will now move on to background information on the timed up and go test. This test, unlike the previous test, is simple, and only consists of one task. The only score derived from this test is the timing it takes in which to complete the test. The timed up and go test has three different variations. The first one, and the one that was used for this project, is getting up from a chair, walking straight, turning around and then sitting back down. The second variation consists of the same thing, only the person has to count down from a random number, between 20 and 100, while performing the test. The third, and final, variation, is the same thing as the first one, only the person has to carry a full cup of water while walking. The task consists of a person sitting in a standard-height chair with arms and then standing up from the sitting position, walking ten feet straight ahead, turn around, walk back to the chair, turn around and sit back down in the chair. The time starts when the person administering the test says “go” and the time ends when the person’s buttocks are touching the chair. If the person needs one, an assistive walking device is available. While the person is getting up, walking, turning around, or sitting down they are given no assistance. In most cases, the person is given a practice run. For this task the cutoff time is 13.5 seconds. This means that a time equal to or below than that is considered normal, while a time longer than that means that person is a fall risk. . The main populations tested with this test are people who have had a stroke, people with Parkinson’s disease, people who have had a spinal cord injury, elderly, and older people living in either

nursing homes or retirement communities. This test had high inter-rater reliability scores for all 3 variations of the test.

Now I will move onto the data portion of the project. I will have two data tables following this paragraph. The first one will be information from the dynamic gait index test and the second one will be information on the timed up and go test. Each data table is thirty randomly-selected people from the information that was gathered. Each table will consist of three columns and thirty rows. The first column will be for gender, the second for age, the third for test score, and one row for each person.

## Dynamic Gait Index Information

Gender	Age	Test Score Out of 24
Male	78	15
Male	63	22
Male	84	15
Male	77	19
Male	72	16
Male	71	21
Male	73	22
Male	73	18
Male	82	14
Male	62	15
Male	67	19
Male	58	18
Male	83	15
Male	76	19
Male	57	21
Female	71	18
Female	69	14
Female	87	16
Female	62	18
Female	60	13
Female	78	15
Female	71	17
Female	59	18
Female	62	16
Female	69	20
Female	55	17
Female	89	21
Female	77	17
Female	65	13
Female	74	20

The average score for these thirty participants is 17.4 out of 24 possible points. This was calculated by adding up all the numbers from the third column, and then dividing that by 30. The average score for the fifteen males is 16.7 and the average score for the fifteen females is 16.9, both out of a possible 24 points. The average for the males was calculated by adding the first fifteen numbers up, from the third column, and then dividing that by 15. The average for the



females was calculated by adding the second fifteen numbers up, from the third column, and then dividing that by 15.

#### Timed Up and Go Test Information

Gender	Age	Test Score in Seconds
Male	88	14
Male	81	12
Male	75	8
Male	61	4
Male	65	15
Male	82	7
Male	82	11
Male	69	8
Male	71	11
Male	82	9
Male	81	14
Male	57	5
Male	58	8
Male	55	7
Male	55	7
Female	80	11
Female	58	8.5
Female	63	13
Female	71	7
Female	60	8
Female	70	8
Female	79	14
Female	67	9
Female	70	9
Female	76	14
Female	71	8
Female	76	7
Female	87	10
Female	77	9
Female	71	9

The average time for these thirty participants is 9.5 seconds. This was calculated by adding up all the numbers from the third column, and then dividing that by 30. The average time for the fifteen males is 9.3 seconds and the average score for the fifteen females is 9.6 seconds. The average for

the males was calculated by adding the first fifteen numbers up, from the third column, and then dividing that by 15. The average for the females was calculated by adding the second fifteen numbers up, from the third column, and then dividing that by 15.

As previously mentioned, the cutoff for the dynamic gait index is less than 19.

According to the average for the entire data set, they are at a higher risk for falling. Since the average for males and females were so close and both under 19, both the males and females are at a higher risk for falling. For the timed up and go test the cutoff for fall risk is 13.5 seconds or longer. The average for the entire data set was 9.5 seconds, which means they are not at a high risk for falling. The average for the males and females were close on this test as well and neither were at a higher risk for falling. In reference to the random thirty individual's test scores from the dynamic gait index they were at a higher risk for falling. On the other hand, the random thirty individual test scores from the timed up and go test indicates they were not at a higher risk for falling. In conclusion, even though both tests monitor for fall risk, the dynamic gait index indicated they were at a high risk for falling, and the timed up and go test indicated they were not a high fall risk.

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## Timed "Up and Go"\*

### Directions

The timed "Up and Go" test measures, in seconds, the time taken by an individual to stand up from a standard arm chair (approximate seat height of 46 cm [18in], arm height 65 cm [25.6 in]), walk a distance of 3 meters (118 inches, approximately 10 feet), turn, walk back to the chair, and sit down. The subject wears their regular footwear and uses their customary walking aid (none, cane, walker). No physical assistance is given. They start with their back against the chair, their arms resting on the armrests, and their walking aid at hand. They are instructed that, on the word "go" they are to get up and walk at a comfortable and safe pace to a line on the floor 3 meters away, turn, return to the chair and sit down again. The subject walks through the test once before being timed in order to become familiar with the test. Either a stopwatch or a wristwatch with a second hand can be used to time the trial.

### Instructions to the patient

"When I say 'go' I want you to stand up and walk to the line, turn and then walk back to the chair and sit down again. Walk at your normal pace."

### Variations

You may have the patient walk at a fast pace to see how quickly they can ambulate. Also you could have them turn to the left and to the right to test any differences.

\*Podsiadlo D, Richardson S. The timed "up and go": a test of basic functional mobility for frail elderly persons. *JAGS* 1991; 39: 142-148.

### Scoring

Time for 'Up and Go' test \_\_\_\_\_ sec.

Unstable on turning?

Walking aid used? Type of aid: \_\_\_\_\_

## Dynamic Gait Index

Grading: Mark the lowest category which applies. Total individual scores (24 possible). Scores of 19 or less have been related to increase incidence of falls in the elderly.

### 1. Gait Level Surface \_\_\_\_\_

*Instructions:* Walk at your normal speed from here to the next mark (20').

Grading: Mark the lowest category that applies.

(3) Normal: Walks 20', no assistive devices, good speed, no evidence for imbalance, normal gait pattern.

(2) Mild impairment: Walks 20', uses assistive devices, slower speed, mild gait deviations.

(1) Moderate impairment: Walks 20', slow speed, abnormal gait pattern, evidence for imbalance.

(0) Severe impairment: Cannot walk 20' without assistance, severe gait deviations, or imbalance.

### 2. Change in gait speed \_\_\_\_\_

*Instructions:* Begin walking at your normal pace (for 5'), when I tell you "go," walk as fast as you can (for 5'). When I tell you "slow," walk as slowly as you can (for 5').

(3) Normal: Able to smoothly change walking speed without loss of balance or gait deviation. Shows a significant difference in walking speeds between normal, fast, and slow speeds.

(2) Mild impairment: Able to change speed but demonstrates mild gait deviations, or no gait deviations but unable to achieve a significant change in velocity, or uses an assistive device.

(1) Moderate impairment: Makes only minor adjustments to walking speed, or accomplishes a change in speed with significant gait deviations, or changes speed but has significant gait deviations, or changes speed but loses balance but is able to recover and continue walking.

(0) Severe impairment: Cannot change speeds, or loses balance and has to reach for wall or be caught.

### 3. Gait with horizontal head turns \_\_\_\_\_

*Instructions:* Begin walking at your normal pace. When I tell you to "look right," keep walking straight, but turn your head to the right. Keep looking to the right until I tell you "look left," then keep walking straight and turn your head to the left. Keep your head to the left until I tell you, "look straight," then keep walking straight but return your head to the center.

(3) Normal: Performs head turns smoothly with no change in gait.

(2) Mild impairment: Performs head turns smoothly with slight change in gait velocity (i.e., minor disruption to smooth gait path or uses walking aid).

(1) Moderate impairment: Performs head turns with moderate change in gait velocity, slows down, staggers but recovers, can continue to walk.

(0) Severe impairment: Performs task with severe disruptions of gait (i.e., staggers outside 15° path, loses balance, stops, reaches for wall).

### 4. Gait with vertical head turns \_\_\_\_\_

*Instructions:* Begin walking at your normal pace. When I tell you to "look up," keep walking straight, but tip your head and look up. Keep looking up until I tell you "look down," then keep walking straight and turn your head down. Keep looking down until I tell you, "look straight," then keep walking straight but return your head to the center.

(3) Normal: Performs head turns with no change in gait.

(2) Mild impairment: Performs task with slight change in gait velocity (i.e., minor disruption to smooth gait path or uses walking aid).

(1) Moderate impairment: Performs tasks with moderate change in gait velocity, slows down, staggers but recovers, can continue to walk.

(0) Severe impairment: Performs task with severe disruption of gait (i.e., staggers outside 15° path, loses balance, stops, reaches for wall).

### **5. Gait and pivot turn \_\_\_\_\_**

*Instructions:* Begin walking at your normal pace. When I tell you to "stop and turn," turn as quickly as you can to face the opposite direction and stop.

- (3) **Normal:** Pivot and turns safely within 3 seconds and stops quickly with no loss of balance.
- (2) **Mild impairment:** Pivot turns safely in >3 seconds and stops with no loss of balance.
- (1) **Moderate impairment:** Turns slowly, requires verbal cueing, requires several small steps to catch balance following turn and stop.
- (0) **Severe impairment:** Cannot turn safely, requires assistance to turn and stop.

### **6. Step over obstacle \_\_\_\_\_**

*Instructions:* Begin walking at your normal speed. When you come to the shoe box, step over it, not around it, and keep walking.

- (3) **Normal:** Able to step over box without changing gait speed; no evidence for imbalance.
- (2) **Mild impairment:** Able to step over box, but must slow down and adjust steps to clear box safely.
- (1) **Moderate impairment:** Able to step over box but must stop, then step over. May require verbal cueing.
- (0) **Severe impairment:** Cannot perform without assistance.

### **7. Step around obstacles \_\_\_\_\_**

*Instructions:* Begin walking at your normal speed. When you come to the first cone (about 6' away), walk around the right side of it. When you come to the second cone (6' past first cone), walk around it to the left.

- (3) **Normal:** Able to walk around cones safely without changing gait speed; no evidence of imbalance.
- (2) **Mild impairment:** Able to step around both cones, but must slow down and adjust steps to clear cones.
- (1) **Moderate impairment:** Able to clear cones but must significantly slow speed to accomplish task, or requires verbal cueing.
- (0) **Severe impairment:** Unable to clear cones, walks into one or both cones, or requires physical assistance.

### **8. Stairs \_\_\_\_\_**

*Instructions:* Walk up these stairs as you would at home (i.e., using the rail if necessary). At the top, turn around and walk down.

- (3) **Normal:** Alternating feet, no rail.
- (2) **Mild impairment:** Alternating feet, must use rail.
- (1) **Moderate impairment:** Two feet to stair, must use rail.
- (0) **Severe impairment:** Cannot perform safely.

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(Adapted from Shumway-Cook A, Wollacott M. *Motor Control: Theory and Practical Applications*. Baltimore: Williams and Wilkins, 1995).