



# Outcome Measure Toolkit for Geriatric Fall/Balance Assessment

Revised 2021



**APTA Geriatrics**<sup>SM</sup>

An Academy of the American  
Physical Therapy Association

*Age on.*

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# Introduction

Dear fellow therapists:

Welcome to the Revised Outcome Measure Toolkit! I am excited to present this document to you. The Outcome Measure Toolkit project is a product of the Balance & Falls Special Interest Group (BFSIG), Geriatric Section of American Physical Therapy Association (APTA Geriatrics).

Falls are the most common cause of injuries and hospital admissions in older adults, and balance is a potentially modifiable factor known to contribute to falls—choosing proper tests and measures is a critical component of balance and falls risk assessment. Evidence-based interventions can then be implemented to improve participation, activity limitations, and impairments of body structure and function for people with balance deficits and risks of falling. In recent decades, an enormous amount of outcome measures have been developed to evaluate balance and to predict falls risk. As falls risks and balance assessments are multidimensional and multifaceted, selecting the optimal outcome measure is challenging.

The BFSIG decided to take on the challenge to create the Outcome Measure Toolkit, providing our members with an updated summary of current outcome measures related to balance and falls risk assessment. As the BFSIG Research Liaison, I am humbled and honored to lead the project.

The original Outcome Measure Toolkit took over two years to ready itself; fourteen taskforce members volunteered their time, effort, and knowledge to make this project possible. The original compiled list had over 245 outcome measures! We hereby present to you the final 108 outcome measures with 91 summary tables. The original Toolkit was published in January 2020 and presented February 2020 at Combined Sections Meeting. Widespread interest and feedback prompted a revision to update the Toolkit. The revision took multiple conferences, discussions, and endless hours of hard work. We hope you find this revised Toolkit helpful, clinically and academically. For this Toolkit to remain current, the list needs to be updated every three to five years. We hope to see more volunteers devote themselves to updating this project in the future. Your participation and contribution helps the BFSIG grow and expand!

Sincerely,

Elizabeth & Carmen

***Elizabeth Wang-Hsu, PT, PhD***

Interim Chair, the Outcome Measure Toolkit Project

Former Research Liaison, Balance and Falls Special Interest Group (2016-2019)

***Carmen Casanova Abbott, PT, PhD***

Co-Chair for the final phases of the original Outcome Measure Toolkit, and Revision Projects



## About the Outcome Measure Toolkit

**The Outcome Measure Toolkit** is based on the consensus opinion of the Taskforce members from the BFSIG. It is an evidenced-based resource for members, but it should not be confused or mistaken for a systematic review/meta-analysis document. The BFSIG Outcome Measure Toolkit seeks to offer a quick summary of information pertinent to the decision process for choosing an outcome measure. The emphasis of the Toolkit was not to perform a full review of the literature, but instead, to provide a quick overview of each outcome measure that can be accessed for clinical practice.

Clinicians are encouraged to use the Toolkit as a **starting point** of information to choose outcome measures that would be appropriate to use in their settings. The references are provided for each table and you are encouraged to locate, read, or search the literature for evidence that supports your specific setting and client population.

### The Original Toolkit (2017-2019)

- **Purposes:**

1. Create an updated summary in the form of an Outcome Measure Toolkit for balance and falls assessment, including the **psychometric properties, falls predictability, population validated, and references** of each outcome measure in a **simple, easy to understand table format**.
2. Provide all APTA Geriatrics Section members a toolkit to easily access current and existing balance and falls outcome measures, with their psychometric properties and falls predictability in the geriatric population in various settings or with different diagnoses.

- **Process and Phases of the Project:**

The project was initiated immediately after Combined Section Meeting (CSM) 2017. Members from BFSIG volunteered to form the taskforce for this project. A few members had to withdraw from the project due to personal reasons, other new members continued to join the project. All taskforce members are acknowledged in page six and seven.

The project was conducted in five phases (see page 8 Flow chart for the details of review process):

- Phase 1 was finding combinations of key words used to thoroughly search for any existing outcome measures that are appropriate for balance and falls assessment. From this search, 260 outcome measures were identified. The results were then streamlined to make a consensus master list of 108 outcome measures. Outcome Measures not related to balance, falls, functional mobility, and strength were excluded from the list (i.e., Mini Mental State Exam).
- Phase 2 was the literature review process. The master list of outcome measures was assigned to taskforce members to review. Each member in each timeline was assigned 3 to 5 outcome measures. Phone conferences were held between each timeline to discuss issues and concerns from taskforce members.
- Phase 3 was cross-validation and recommendations.
- Phase 4 was updating of literature from 2018-2019.
- Phase 5 was formatting of the BFSIG Outcome Measure Toolkit and dissemination.

## **The Revision Project (2020-2021)**

- **Purpose:**

The purpose of the revision project were to update the Outcome Measure Toolkit, reassess recommendations based upon additional literature found, correct/edit errors that were oversights from the original Toolkit, and add information about references' populations to the tables to assist clinicians with decision-making about tool use.

- **Process:**

The Toolkit revision process was initiated after CSM 2020, beginning in March and finished in March 2021. Several assignments were given to the taskforce members, including:

1. Performed a 2010-2021 literature search of the original toolkit's outcome measures, and for any new or otherwise previously-excluded measures needing to be considered. Suggested searching terms were the name of the tool AND any of the following: validity, reliability, falls, sensitivity,

specificity, positive/negative predictive value, older adults. Literature searches occurred through PubMed, CINAHL, Google Scholar, PsychInfo, consistent with the original Toolkit search.

2. Read and extracted population information, reliability, validity, Minimum Detectable Change (MDC), cutoff score, sensitivity (Sn), specificity (Sp), positive predictive value (PPV), and negative predictive value (NPV) from retrieved studies and place into the Toolkit tables. While there was a multitude of literature available, included studies provided information on the established metrics per the original project. Only studies that provided the needed information were included in the summary tables. One article may have been included because it provided data of reliability, but without fall predictability. Another article may have been included because it provided data of fall sensitivity, but not reliability or validity. Each table, hopefully, painted a complete picture of the outcome measure. Conversely, we also included articles that validated the outcome measures in populations of specific diagnoses, certain settings, or age group; other than community-dwelling older adults.
3. Compared original recommendation to the updated table based on new evidence, and revised the recommendation if warranted.
4. Compiled tables and updated the Toolkit document.
5. The Revision Document was then reviewed and approved by the taskforce members, BFSIG executives, and APTA Geriatrics Practice Committee.

- **Key Updates in the Revision Document**

1. Tables are amended, and now include updated content from recent literature up to 2019, and descriptions of subject populations. In addition, references are listed following each table.
2. Recommendations are adjusted based on evidence. In addition, a few outcome measures, i.e., TUG, was accidentally left out in the recommendation section of the original Toolkit, is now included in the revision document.
3. Population and setting information are edited with more details. We also tried our best to make them look consistent. Unfortunately, some authors provided only mean age or age range, instead of mean

and standard deviations. A handful of articles did not publish participants' age information. In these cases, we specifically pointed out "information on age details not available".



## **, Taskforce Members**

The APTA Geriatrics Balance & Falls Special Interest Group would like to recognize and extend its gratitude to the taskforce members, who volunteered their time, effort, and knowledge to this project.

### **The Original Toolkit Taskforce**

***Elizabeth Wang-Hsu, PT, PhD (Chair)***

Research Liaison for APTA Geriatrics Balance and Falls SIG 2016-2019

***Heidi Moyer\*†, PT, DPT (Co-Chair for the initial phases)***

Secretary, APTA Geriatrics Balance and Falls SIG

Eastern Regional Coordinator, APTA Geriatrics State Advocate Program

***Carmen Casanova Abbott, PT, PhD (Co-Chair for the final phases)***

#### ***Core Taskforce Members***

Anne Reilley\*, PT, DPT, MS

Susan Glenney\*†, PT, DPT

Mariana Wingood\*†, PT, DPT

#### ***Adjunct Taskforce Members***

Ryan Allison, PT, DPT

Harsha Dhingra†, PT, MS

Emma Phillips, PT, DPT

Haim Nesser†, PT, DPT

Paula Graul\*†, PT, MS

Shweta Subramani†, PT, MHS

Ashley Bell, PTA

Jennifer Vincenzo\*, PT, MPH, PhD (Chair, BFSIG)



## **The Revision Toolkit Taskforce**

***Elizabeth Wang-Hsu, PT, PhD (Chair)***  
***Carmen Casanova Abbott, PT, PhD (Co-Chair)***

### ***Core Taskforce Members***

Anne Reilley\*, PT, DPT, MS  
Susan Glenney\*†, PT, DPT  
Michelle (Missy) Criss\*, PT, DPT, PhD  
Paula Graul\*†, PT, MS  
Shweta Subramani†, PT, MHS  
J. Kele Murdin\*†, PT, MPT  
Cindy Lane Moore\*, PT, MPH, DPT

### ***Adjunct Taskforce Members***

Abigail Cavallo, PT, DPT  
Amber Kilgore, PT, DPT

### ***Balance & Falls SIG Executives Provided Feedback/Review***

Jennifer Vincenzo\*, PT, MPH, PhD (Chair)  
Heidi Moyer\*†, PT, DPT (Secretary/Treasurer)  
Jennifer Gindoff, PT, DPT\* (Research Liaison)  
Ann Lowrey, PTA (PTA Liaison)  
Holly Bennett, PT, DPT (Early Career Professional Co-Liaisons)

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\* Board Certified Clinical Specialist in Geriatric Physical Therapy (GCS)  
† Certified Exercise Expert for Aging Adults (CEEAA)

# Outcome Measure Toolkit Project Searching Key Words and Database

## **Combination of Words:**

Fall, Falls, Fall Risk, Falls Risk, Balance, Functional Mobility, Strength, Older Adults, Aged, Geriatric, Elderly, Frail, Community-Dwelling, Independent Living, Nursing Home, Institutionalized, Skilled Nursing Facility, Residential Care, Long Term Care, Outcome Measure, Assessment.

## **Database Searched:**

PubMed, CINAHL, Google Scholar, PsychInfo

## **Falls**

Word	Definition
Fall/Falls	Any event that leads to an unplanned, unexpected contact with a supporting surface. This does NOT include falls that are the result of an outside force such as a push or shove or falls that are the result of a medical event such as a MI, syncope or fainting.

## **Population Examined**

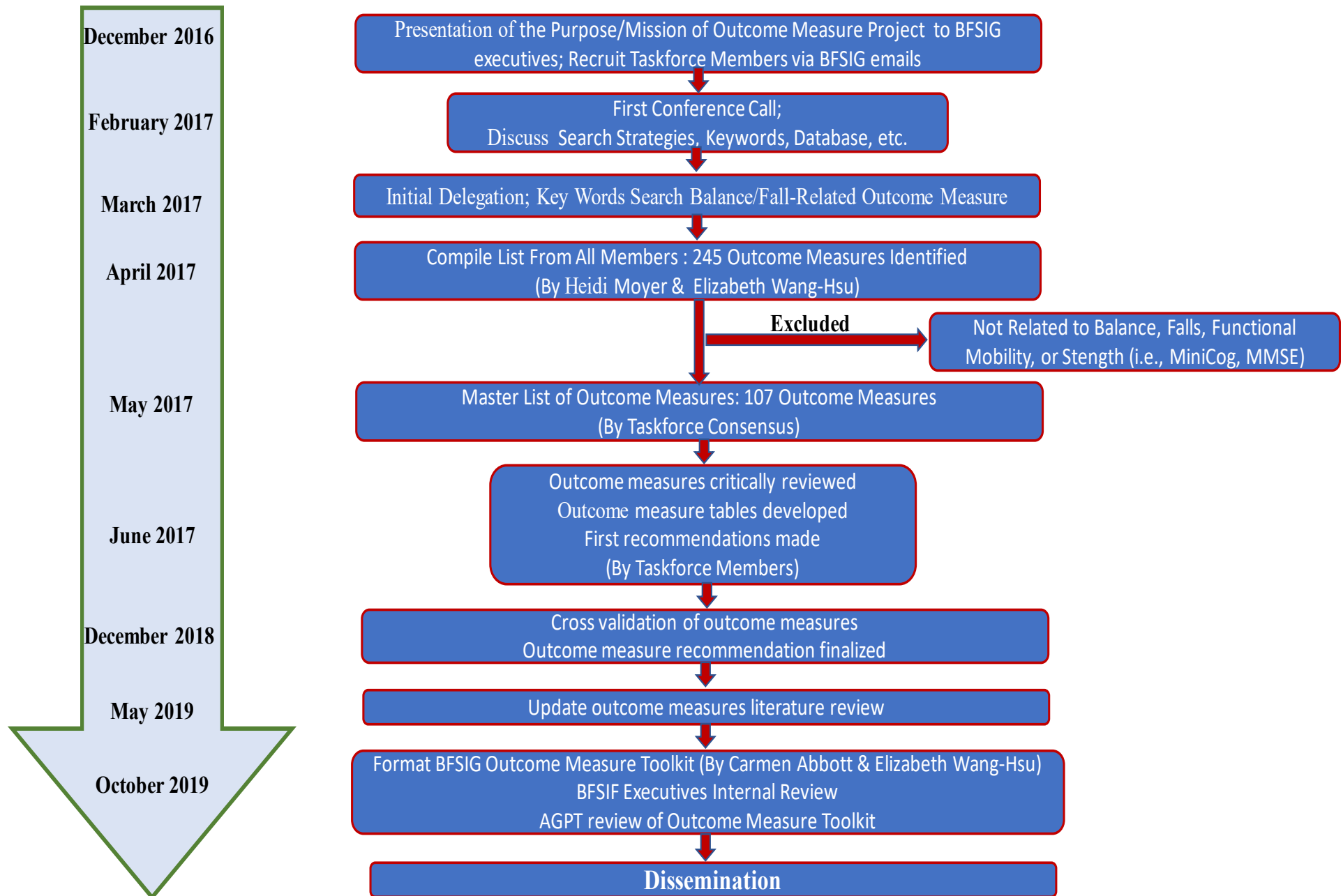
Word	Definition
Older Adults	According to Medicare ( <a href="https://www.cdc.gov/cdi/definitions/older-adults.html">https://www.cdc.gov/cdi/definitions/older-adults.html</a> ), a person over the age of 65 years.
Elderly	Older adults or aged individuals.
Aged	A person 65 through 79 years of age. For a person older than 79 years, aged, 80 and over is available
Aged, 80 and over	A person 80 years of age and older.
Frail elderly (Elderly, Frail)	Older adults or aged individuals who are lacking in general strength and are unusually susceptible to disease or to other infirmity.

Frail Older Adults	A person 65 or older who are lacking in general strength and are unusually susceptible to disease or to other infirmity.
Community-Dwelling Adults	A person over age of 65 residing in the community or assisted living without distinction about health/frailty status.
Independent Living	A housing and community arrangement that maximizes independence and self-determination.

### **Item Examined**

Word	Definition
Outcome Assessment	Research aimed at assessing the quality and effectiveness of health care as measured by the attainment of a specified end result or outcome. Measures include parameters such as improved health, lowered morbidity or mortality, and improvement of abnormal states (such as elevated blood pressure).
Outcome Measure	Evaluations of the efficacy/effectiveness of an intervention on the premise of gauges taken prior to, during, and following the intervention.

# Original Outcome Measure Toolkit Project Search/Review Flow Chart



## Master List of Outcome Measures Assessing Balance/Falls Risk Being Reviewed

- |     |   |     |   |
|-----|---|-----|---|
| 1.  | 2 Minute Walk Test & other similar timed walks such e.g., 6 Minute Walk                     | 20. | Brunel Balance Assessment   |
| 2.  | 21 Item Fall Risk Index   | 21. | Canadian Occupational Performance Measure                               |
| 3.  | 25 Question Geriatric Locomotive Function Scale   | 22. | Clinical Test of Sensory Interaction and Balance (CTSIB)                |
| 4.  | 30 Second Chair Stand Test (30 Seconds Sit to Stand)  | 23. | Community Balance and Mobility Scale                                    |
| 5.  | 360 Degree Turn Time  | 24. | Scale of Balance Confidence (CONFbal)                                   |
| 6.  | 4 Square Step Test  | 25. | Conley Scale  |
| 7.  | 4 Stage Balance Test (No Summary Table; see page 21 for details)                            | 26. | Demura's Fall Risk Assessment Chart (DFRA)                              |
| 8.  | 5 Times Sit to Stand & 10 Times Sit to Stand  | 27. | Downton Fall Risk Index   |
| 9.  | Activity-Based Balance and Gait   | 28. | Dynamic Gait Index (DGI)  |
| 10. | Activities Specific Balance Confidence Scale (ABC)  | 29. | Elderly Fall Screening Test   |
| 11. | Activities Specific Fall Caution Scale  | 30. | Elderly Mobility Scale  |
| 12. | Alternate Step Test   | 31. | Euroqual  |
| 13. | Attitudes to Falls-Related Interventions Scales (No Summary Table; see page 15 for details) | 32. | Fall Handicap Inventory   |
| 14. | Balance Evaluation Systems Test (Table included BESTest; BESTmini; BESTbrief)               | 33. | Fall Perception Questionnaire   |
| 15. | Balance Outcome Measure for Elder Rehabilitation (BOOMER)                                   | 34. | Fall Prevention Strategy Survey   |
| 16. | Balance Self-Efficacy Test (No Summary Table; see page 15 for details)                      | 35. | Fall Risk for Older People in the Community Assessment                  |
| 17. | Balance Self-Perceptions Test   | 36. | Falls Behavioral Scale  |
| 18. | Bed Rise Difficulty (BRD) Scale   | 37. | Falls Efficacy Scale (FES)  |
| 19. | Berg Balance Scale  | 38. | Fear Avoidance Beliefs Questionnaire (FABQ)                             |
|     |   | 39. | Figure 8 Walking Test   |
|     |   | 40. | Floor Rise Test   |
|     |   | 41. | Frenchay Activity Index (No Summary Table; see page 15 for details)     |
|     |   | 42. | Fugl-Meyer Motor Assessment (No Summary Table; see page 15 for details) |
|     |   | 43. | Fullerton Advanced Balance Scale (FAB)                                  |

44. Functional Ambulation Category
45. Functional Fitness Test (No Summary Table; see page 15 for details)
46. Functional Gait Assessment
47. Functional Independence Measure (FIM)
48. Functional Mobility Assessment Tools (FMA; No Summary Table; see page 15 for details)
49. Functional Reach Test
50. Gait Abnormality Rating Scale
51. Gait Efficacy Scale
52. Gait Speed (meter/sec)
53. Geriatric Fear of Falling Assessment
54. Global Deterioration Scale
55. Goal Attainment Scale (No Summary Table; see page 16 for details)
56. Groningen Activity Restriction Scale
57. Grip Strength
58. Guralnik Test Battery (No Summary Table; see page 16 for details)
59. Hauser Ambulation Index
60. Health-Related Quality of Life (No Summary Table; see page 16 for details)
61. Hendrich II Fall Risk Model
62. High Level Mobility Assessment Tool
63. Home Falls and Accidental Screening Tool
64. International Physical Activity Questionnaire
65. L Test of Functional Mobility
66. LASA Fall Risk Profile
67. Late-Life Function and Disability Instrument
68. Missouri Alliance for Home Care (MAHC-10)
69. Melbourne Fall Risk Assessment Tool (MFRAT)
70. Minimal Chair Height Standing Ability
71. Mobility Interaction Fall Chart
72. Morse Fall Scale
73. Motor Fitness Scale
74. Multiple Lunge Test
75. Multiple Sclerosis Walking Scale-12
76. Norwegian General Motor Function Assessment (No Summary Table; see page 16 for details)
77. Penisual Health Fall Risk Assessment Tool (PHRAT)
78. Perceived Participation and Autonomy (No Summary Table; see page 16 for details)
79. Peter James Centre Fall Risk Assessment Tool (No Summary Table; see page 16 for details)
80. Physical Activity Questionnaire
81. Physical Mobility Scale
82. Physical Performance Test
83. Physiological Profile Assessment
84. Push and Release Test
85. Queensland Fall Risk Assessment Tool (QFRAT)
86. Rivermead Mobility Index
87. Rogers Modular Obstacle Course (No Summary Table; see page 16 for details)
88. Romberg Test
89. Self-Efficacy Scale (SES)
90. Short Health Form Survey (Table included SF8, SF12, SF36)
91. Short Physical Performance Battery (SPPB)

- |  |  |
|--|--|
| <p><b>92.</b> Shuttle Walk, AKA incremental shuttle walk test (ISWT)</p> <p><b>93.</b> Sickness Impact Profile (Physical Dimension)</p> <p><b>94.</b> Single Leg Stance</p> <p><b>95.</b> St. Thomas Risk Assessment Tool (STRATIFY)</p> <p><b>96.</b> Stopping Elderly Accidents, Deaths, &amp; Injuries (STEADI)</p> <p><b>97.</b> Stroke Assessment Fall Risk</p> <p><b>98.</b> Stroop Stepping Test</p> <p><b>99.</b> Subjective Risk Rating of Specific Tasks</p> <p><b>100.</b> Survey of Activities and Fear of Falling in the Elderly</p> <p><b>101.</b> Tandem test (Included in Romberg)</p> | <p><b>102.</b> The Obstacle Course</p> <p><b>103.</b> Timed Up and Go</p> <p><b>104.</b> Timed Up and Go: Dual Task</p> <p><b>105.</b> Tinetti Performance-Oriented Mobility Assessment (POMA)</p> <p><b>106.</b> University of Illinois at Chicago Fear of Falling Measure (UIC FFM)</p> <p><b>107.</b> Western Ontario and McMaster Osteoarthritis Index (WOMAC; No Summary Table; see page 17 for details)</p> <p><b>108.</b> World Health Organization Quality of Life (WHOQoL; No Summary Table; see page 17 for details)</p> |
|--|--|



## **Outcome Measures with Evidence of Psychometric Properties and Falls Risk Predictability**

1. 4 Square Step Test
2. 5 Times Sit to Stand (10 Times Sit to Stand)
3. Activities Specific Balance Confidence Scale
4. Balance Evaluation Systems Test (BESTest; BESTmini; BESTbrief)
5. Berg Balance Scale
6. Dynamic Gait Index (DGI)
7. Figure 8 Walking Test
8. Functional Gait Assessment
9. Functional Reach Test
10. Gait Speed (meter/sec)
11. Grip Strength
12. Hendrich II Fall Risk Model (inpatient population only)
13. Morse Fall Scale
14. Physical Performance Test
15. Physiological Profile Assessment (PPA)
16. Short Physical Performance Battery (SPPB)
17. Single Leg Stance
18. The Obstacle Course
19. Timed Up and Go
20. Tinetti Performance-Oriented Mobility Assessment (POMA)

## Outcome Measures Not Supported in Relation to Balance/Falls Assessment in the Older Adult Population and Rationales

1. **Attitudes to Falls-Related Interventions Scales:** From Prevention of Falls Network Europe [ProFaNE] (2006). This is a questionnaire to assess attitudes related to balance and falls interventions. The web link no longer works; therefore, no summary table presented in this document.
2. **Balance Self-Efficacy Test:** Studies on this test only looked at activity participation, not falls. In addition, there are no studies that validate this test; therefore, no summary table presented in this document.
3. **Canadian Occupational Performance Measure (COPM):** The COPM is used as a measure of life satisfaction and reintegration into normal living. It has no evidence in falls risk.
4. **Euroqual:** Euroqual is a descriptive profile and index of health status measure from the early 1990s. It is not recommended for falls risk assessment due to minimal evidence and no recent literature.
5. **Fall Handicap Inventory:** There is no further study since the original report. In addition, the report was a letter to the editor, not an article.
6. **Frenchay:** It was validated in 1993, but there is little evidence following this validation. Therefore, no summary table is presented in this document.
7. **Fugl-Meyer Motor Assessment:** This measure is great for assessing motor recovery post stroke, but it is not correlated with falls or balance. It is used mainly in studies to classify subjects and can be used to assess intervention efficacy with other balance measures. There is no evidence on psychometric properties; therefore, no summary table presented in this document.
8. **Functional Fitness Test – Senior Fitness Test:** The test was developed in 1999 to measure the key components to fitness. Age group and gender norms for fitness have been established and updated in 2013 along with some criterion norms for loss of independence and mobility decline. This test battery as a whole has not been researched for falls risk screening or assessment; therefore, no summary table presented in this document.
9. **Functional Mobility Assessment Tool (FMA):** Functional mobility assessment (FMA) instrument is a self-report outcome tool designed to measure the effectiveness of wheeled mobility and seating, not a falls assessment; therefore, no summary table presented in this document.
10. **Gait Abnormality Rating Scale:** There is minimal research supporting the Gait Abnormality Rating Scale, however, there is a modified version currently in the process of validation.
11. **Gait Efficacy Scale:** There is minimal research supporting the Gait Efficacy Scale, however, there is a modified version currently in the process of validation.

12. **Global Deterioration Scale:** This scale is not a falls assessment, but a dementia/cognitive assessment tool.
13. **Goal Attainment Scale:** This is scale is for patient-centered goals attainment. The population and psychometric property varied depending on the population and goals selected. In addition, it used a T-score; therefore, no summary table presented in this document.
14. **Guralnik Test Battery:** We were unable to find evidence to validate this performance-based test battery; therefore, no summary table presented in this document.
15. **Health-Related Quality of Life:** This is a quality of life assessment, not a balance and falls assessment; therefore, no summary table presented in this document.
16. **International Physical Activity Questionnaire:** This questionnaire with limited studies and varied validity is not a falls assessment measure. It is used as an indication of activity level and has no established link to balance performance and falls risk. See systematic review by Lee et al 2018 for more information
17. **L Test of Functional Mobility:** This test is a modified version of the Timed Up and Go Test designed for people with lower limb amputations. It is not a general falls assessment measure.
18. **Late Life Function and Disability Instrument:** This instrument is not a falls assessment measure.
19. **Motor Fitness Scale:** There is little evidence to support use of this scale in balance and falls management in the older adult population.
20. **Norwegian General Motor Function Assessment:** This assessment has very limited study. It is recommended to look at the General Motor Function Assessment instead. No summary table presented in this document.
21. **Perceived Participation and Autonomy:** There are many studies on vertigo and how it affects falls, but none on how this assessment tool is used for identifying falls risk; therefore, no summary table presented in this document.
22. **Peter James Centre Fall Risk Assessment Tool:** No studies found on this tool; therefore, no summary table presented in this document.
23. **Physical Activity Questionnaire (CHAMPS):** CHAMPS is a valid and reliable measure, however, no link to falls risk prediction.
24. **Physical Mobility Scale:** This is a scale of disability or functional mobility in residential older adults that is used to determine physical assistance in care facilities. It is not applicable to balance or falls risk assessment.
25. **Rivermead Mobility Index:** This index is a mobility test with limited supporting literature found
26. **Roger Modular Obstacle Course:** There were no articles found; therefore, no summary table presented in this document.
27. **Self-Efficacy Scale (SES):** This scale measures self-efficacy in strength, stamina, and memory. It is not related to balance and falls.

28. **Western Ontario and McMaster Osteoarthritis Index (WOMAC):** A patient reported outcome measure (PROM) that is used to evaluate the pain, stiffness, and physical function of patients with osteoarthritis of the hip and knee. It is not a balance and falls assessment. Studies are needed to link to balance and falls risks; therefore, no summary table presented in this document.
29. **World Health Organization Quality of Life (WHOQoL):** This has not been cross validated with other balance and falls measures. This measure is not a direct assessment of balance or falls and its primary purpose is not related. No summary table presented in this document.

## Outcome Measures Related to Balance/Falls Risk Assessment but Warranting Additional Research for Further Validation

1. **21 Item Fall Risk Index:** No further evidence reported aside from the original article.
2. **25 Question Geriatric Locomotive Function Scale:** This scale is not widely used and has limited evidence to support it.
3. **Activity-Based Balance and Gait:** No further evidence reported aside from the original article.
4. **Activity Specific Fall Caution Scale:** No further evidence reported aside from the original article.
5. **Alternate Step Test (Step Test):** It is a component of Berg Balance Scale that is not widely studied.
6. **Balance Outcome Measure for Elder Rehabilitation (BOOMER):** There are two articles supporting the measure from 2007 and 2011, but more is warranted.
7. **Balance Self Perception Test:** There was only one study found to support this measure.
8. **Bed Rise Difficulty Scale:** This scale assesses mobility with limited studies related to falls assessment.
9. **Brunel Balance Assessment:** There were limited studies with insufficient information to support this assessment.
10. **Clinical Test of Sensory Integration & Balance (CTSIB):** Most of research supporting the CTSIB were in other populations. It has moderate construct validity. This measure warrants studies in older adult balance/falls assessment.
11. **Community Balance & Mobility Scale (CB&M):** Strength, balance, and quality of life measure for young elders and young adults. There is no evidence that it can predict falls risk.
12. **CONFbal Scale of Balance Confidence:** It is a balance confidence scale with limited evidence related to falls predictability.
13. **Conley Scale:** There is limited evidence to support this measure.
14. **Demura's Fall Risk Assessment Chart (DFRA):** This chart is a 50 item list used in Japan in a large population study. Further research is needed to decrease the number of items on the list if it will be used in other countries and general practice.
15. **Downton Fall Risk Index:** There are few studies to support this measure. The index uses an inpatient population and has low specificity.
16. **Elderly Mobility Scale (EMS):** EMS was developed for use with frail elderly adults for mobility status. It is not validated for falls risks.
17. **Elderly Fall Screening Test:** This measure is not well studied, however, early work shows falls risk predictability.
18. **Fall Perception Questionnaire:** This measure looks at adult perception about falls risk. However, it is not a falls risk predictor, further studies needed to link to falls risk predictability.

19. **Fall Prevention Strategy Survey:** This measure is studied on the Multiple Sclerosis population, however, only the original article (2009) was found. Further study is needed. The original article in 2009 conducted a Rasch Validation Analysis. This outcome measure was identified as a valid tool to examine the frequency of engaging in protective behaviors related to falls risk among adults with Multiple Sclerosis and to track outcomes of behaviorally oriented falls reduction interventions, but has not been identified as a tool for assessment of falls risk.
20. **Fall Risk for Older People in the Community Assessment:** This measure has a moderate capacity to predict falls, but needs further studies.
21. **Falls Behavioral Scale:** Limited research supporting this scale with no cutoff score or stratification for falls risk. There were two articles found about the scale, however, access was only available to the initial article (2003). We were unable to access the other 2008 article published in the Journal of Disability and Rehabilitation. Review table completed with the initial research article information on validity and reliability.
22. **Floor Rise Test:** There is limited research supporting its use.
23. **Fullerton Advanced Balance Scale (FAB):** One study in 2008 presented a cutoff. There is a Sn, Sp, and PPV for falls predictability. This scale warrants more research.
24. **Functional Ambulation Category:** Sn and Sp are established. It is used in post stroke population and can be used to predict community ambulation post stroke. This scale warrants more studies in other populations.
25. **Geriatric Fear of Falling Measure:** There is significant validity with FES. It has good reliability but is not studied very well in populations outside of Northern Taiwan. It is touted as a screening tool for nursing.
26. **Groningen Activity Restriction Scale:** It is a mobility restriction assessment scale. More studies are needed to evaluate the relationship to balance and falls risk.
27. **Hauser Ambulation Index:** It has been validated against multiple other outcome measures for the Multiple Sclerosis population, however, more studies are needed for other populations and for falls risk prediction.
28. **High Level Mobility Assessment Tool:** There is one article for validity, reliability, and MDC in inpatient traumatic brain injury population, however, there are no studies for other populations or to predict falls risk.
29. **Home Falls and Accidental Screening Tool:** This is a reliable and valid home falls assessment survey/questionnaire. This is one study with a large sample size with high sensitivity and low specificity that presented cutoff score as 9. It has also been validated in foreign languages including Malaysia and Chinese. However, no report found in US population.
30. **LASA Fall Risk Profile:** There are limited studies, but nothing since 2010.
31. **Melbourne Fall Risk Assessment Tool (MFRAT):** This is a novel assessment tool targeting residential population (nursing home and long-term care facilities), but no other validation except the original article. More research warranted in this population.

32. **Minimal Chair Height Standing Ability:** This is a novel assessment tool from 2015. The original article validated it with a large sample ( $n = 156$ ), however, more validation is warranted.
33. **Mobility Interaction Fall Chart:** This is a functional assessment for residential care population. Only the original article provided some validation.
34. **Multiple Sclerosis Walking Scale-12:** This scale has good psychometrics but limited to use in Multiple Sclerosis population. Data is limited to younger population due to the progressive and debilitating nature of Multiple Sclerosis.
35. **Multiple Lunge Test:** This test has an established Sn and Sp, but limited research in last five years.
36. **Peninsula Health Fall Risk Assessment Tool (PHRAT):** This tool needs more research to support it.
37. **Push and Release Test:** There was one study in 2006. No other evidence to support the test.
38. **Queensland Fall Risk Assessment Tool (QFRAT):** There is very limited evidence on this tool after 2014. Most of the research was conducted more than five years ago.
39. **Stroop Stepping Test:** This is a low cost test capable of distinguishing fallers from non-fallers, however, it has limited research in the last five years. A computer program with a specialized mat sensor is required to track response time and accuracy.
40. **Stroke Assessment Fall Risk:** While this measure has promising falls risk predictability in stroke population, there is no reliability evidence found. More studies are needed for other populations/diagnoses.
41. **Subjective Risk Rating of Specific Tasks:** One original article in 2011 validated the measure, but it needs more study.
42. **Survey of Activities and Fear of Falling in the Elderly:** This measures activity and fear of falling (not efficacy or confidence), however, only the original article validated this tool.
43. **The Falls Behavior Scale:** It has the potential to be a useful tool but is not widely used and has not been well researched to identify falls risk predictability.
44. **University of Illinois at Chicago Fear of Falling Measure (UIC FFM):** This tool measures the construct of fear of falling (not efficacy or confidence), however, only the original article validated it. Many presentations/abstracts/proceedings found at various conferences (ISPRM, IAAG, CSM), but are not published yet.



## Outcome Measures Widely Used, but with Limited Recent Evidence Related to Falls Risks

1. **2 Minute Walk Test and other similar timed tests e.g., 6 Minute Walk:** This outcome measure was designed to measure aerobic capacity/endurance, however, its predictability of falls risk is yet to be established.
2. **30 Second Chair Stand Test ((30 Seconds Sit to Stand):** There is significant amount of evidence for falls risk prediction, however, there are no cutoff scores, just comparisons to age norms. There is minimal cross validation to different diagnoses.
3. **360 Degree Turn:** Incorporated into many tests, but as a stand-alone it has significant variability in the cutoff time/steps. Despite inconsistent cutoff, it still has high sensitivity and specificity.
4. **4 Stage Balance Test:** There is no study that looked at this test alone. It is usually a part of other test batteries (i.e., STEADI). There is no summary table presented in this document as no study singled out this test.
5. **Falls Efficacy Scale (FES):** It is supported for falls, but not well studied for predictive capability. There is no recent literature on this scale.
6. **Fear Avoidance Beliefs Questionnaire (FABQ):** It is validated against other outcome measures (i.e., FES, BBS, etc.), however, it does not have evidence in cutoff scores to support use in predicting falls risk. No summary table in this document.
7. **Functional Independence Measure (FIM):** No strong evidence in the literature to support the use of FIM to identify falls risk. Petitoierre et al 2010 identified poor Sn, Sp for using FIM to identify falls risk at two different cutoff scores. Much of the literature on the FIM discusses its use in determining rehab potential, overall functional prognosis, and to monitor progress in rehab settings. Forest et al 2016 identified that FIM scores at admission are inversely related to falls risk but without cutoff scores.
8. **Missouri Alliance for Home Care (MAHC-10):** This is used at home health setting in all Epic and other EMR systems. Information only found in the original article. More evidence is warranted.
9. **Romberg Test (Includes Tandem Stance):** This is a reliable and valid test; however, it is seldomly used alone. It is usually part of a larger assessment (BESTest, STEADI).
10. **Short Health Form Survey (SF8, SF12, SF36):** This survey is widely utilized, however, only one recent article (Lusardi et al., 2017) has linked it to falls risk assessment. More research is needed.
11. **Shuttle Walk:** This is a reliable aerobic capacity test, however, more research is needed to establish a link to balance and falls risks. Additional information found and while it is correlated with the Berg, there has not been convincing evidence found for the ability to predict falls.

12. **Sickness Impact Profile (SIP)-Physical Dimension:** This document looks only at physical dimension. It has been researched and used for many diagnoses, but unsure if it corresponds to falls/balance assessment. There is no direct evidence regarding falls risk.
13. **Stopping Elderly Accidents, Deaths, and Injuries (STEADI):** Recent evidence emerging on STEADI's ability to predict fallers, but most studies discuss implementation of the risk screening process and not validity, reliability, or predictive value of the STEADI itself. Recommend looking to the reliability, validity, and predictive power of the individual items for best guidance. STEADI is mostly used by PT as a falls screening tool, but it needs continued refinement and field validation of its use in primary care.
14. **St. Thomas Risk Assessment Tool (STRATIFY):** Used as a hospital/inpatient falls screening tool to identify patient's falls risk, however, literature reports inconsistent predictive accuracy. This raises questions about operational usefulness. More studies are warranted for falls predictability.
15. **Timed Up and Go - Dual Task:** Incorporated into other tests, however, there are many varieties clinically. More studies are needed for cutoff scores linked to falls predictability.

## Outcome Measures Divided by Setting

### Outcome Measures Studied in Community Setting (Includes Independent Living Residence)

- |  |  |
|--|--|
| 1. 21 Item Fall Risk Index                                       | 24. Fall Prevention Strategy Survey                        |
| 2. 25 Question Geriatric Locomotive Scale                        | 25. Fall Risk for Older People in the Community Assessment |
| 3. 30 Second Chair Stand Test (30 Seconds Sit to Stand)          | 26. Falls Behavioral Scale                                 |
| 4. 360 Degree Turn Time  | 27. Falls Efficacy Scale (FES)                             |
| 5. 4 Square Step Test  | 28. Fear Avoidance Beliefs Questionnaire (FABQ)            |
| 6. Five Times Sit to Stand Test                                  | 29. Figure 8 Walking Test                                  |
| 7. Activities Specific Balance Confidence Scale                  | 30. Floor Rise Test  |
| 8. Activity-Based Balance and Gait                               | 31. Fullerton Advanced Balance Scale (FAB)                 |
| 9. Balance Evaluation System Test (BESTest; BESTmini; BESTbrief) | 32. Functional Gait Assessment (FGA)                       |
| 10. Balance Self-Perceptions Test                                | 33. Functional Independence Measure (FIM)                  |
| 11. Bed Rise Difficulty Scale                                    | 34. Functional Reach Test (FRA)                            |
| 12. Berg Balance Scale   | 35. Gait Abnormality Rating Scale                          |
| 13. Brunel Balance Assessment                                    | 36. Gait Efficacy Scale                                    |
| 14. Canadian Occupational Performance Measure (COPM)             | 37. Gait Speed   |
| 15. Clinical Test of Sensory Interaction and Balance (CTSIB)     | 38. Geriatric Fear of Falling Assessment                   |
| 16. Community Balance and Mobility Scale                         | 39. Groningen Activity Restriction Scale                   |
| 17. CONFal Scale of Balance Confidence                           | 40. Grip Strength  |
| 18. Demura's Fall Risk Assessment Chart (DFRA)                   | 41. Home Falls and Accidental Screening Tool               |
| 19. Downton Fall Risk Index                                      | 42. Late Life Function and Disability Instrument           |
| 20. Dynamic Gait Index   | 43. LASA Fall Risk Profile                                 |
| 21. Elderly Fall Screening Test                                  | 44. Minimal Chair Height Standing Ability                  |
| 22. Elderly Mobility Scale (EMS)                                 | 45. Motor Fitness Scale                                    |
| 23. Euroqual   | 46. Multiple Lunge Test                                    |
|  | 47. Multiple Sclerosis Walking Scale-12                    |
|  | 48. Peninsula Health Fall Risk Assessment Tool (PHRAT)     |

49. Physical Activity Questionnaire (CHAMPS)
50. Physical Mobility Scale
51. Physical Performance Scale
52. Physiological Profile Assessment
53. Push and Release Test
54. Queensland Fall Risk Assessment Tool (QFRAT)
55. Romberg Test
56. Self-Efficacy Scale (SES)
57. Short Physical Performance Battery (SPPB)
58. Shuttle Walk
59. Single Leg (Limb) Stance
60. Stopping Elderly Accidents, Deaths, & Injuries (STEADI)
61. Stroop Stepping Test
62. Subjective Risk Rating of Specific Tasks
63. Survey of Activities and Fear of Falling in the Elderly
64. The Obstacle Course
65. Timed Up and Go Test
66. Timed Up and Go - Dual Task
67. Tinetti Performance-Oriented Mobility Assessment
68. University of Illinois at Chicago Fear of Falling Measure (UICFFM)

## **Outcome Measures Studied in Acute Hospital Setting**

1. Balance Evaluation System Test (BESTest; BESTmini; BESTbrief)
2. Berg Balance Scale
3. Community Balance and Mobility Scale
4. Conley Scale
5. Downton Fall Risk Index
6. Dynamic Gait Index
7. Elderly Mobility Scale (EMS)
8. Fear Avoidance Beliefs Questionnaire (FABQ)
9. Figure 8 Walking Test
10. Fullerton Advanced Balance Scale (FAB)
11. Functional Independence Measure (FIM)
12. Functional Reach Test
13. Gait Speed
14. Groningen Activity Restriction Scale
15. Grip Strength
16. Hendrich II Fall Risk Model
17. High Level Mobility Assessment Tool
18. Melbourne Fall Risk Assessment Tool (MFRAT)
19. Morse Fall Scale
20. Short Physical Performance Battery (SPPB)
21. Single Leg Stance (Single Limb Standing)
22. St. Thomas Risk Assessment Tool (STRATIFY)
23. Timed Up and Go Test
24. Tinetti Performance-Oriented Mobility Assessment (POMA)
25. World Health Organization Quality of Life (WHOQoL)

## Outcome Measures Studied in Inpatient Rehab (Rehab Hospital or SNF) Setting

1. 4 Square Step Test
2. Balance Evaluation System Test (BESTest; BESTmini; BESTbrief)
3. Balance Outcome Measure for Elder Rehabilitation (BOOMER)
4. Berg Balance Scale
5. Brunel Balance Assessment
6. Clinical Test of Sensory Interaction and Balance (CTSIB)
7. Community Balance and Mobility Scale
8. Downton Fall Risk Index
9. Dynamic Gait Index
10. Falls Efficacy Scale (FES)
11. Figure 8 Walking Test
12. Fullerton Advanced Balance Scale (FAB)
13. Functional Ambulation Category
14. Functional Gait Assessment
15. Functional Independence Measure (FIM)
16. Functional Reach Test
17. Gait Speed
18. Grip Strength
19. Hendrich II Fall Risk Model
20. High Level Mobility Assessment Tool
21. Melbourne Fall Risk Assessment Tool (MFRAT)
22. Morse Fall Scale
23. Peninsula Health Fall Risk Assessment Tool (PHRAT)
24. Rivermead Mobility Index
25. Short Physical Performance Battery (SPPB)
26. Shuttle Walk
27. Single Leg Stance (Single Limb Standing)
28. Stroke Assessment Fall Risk
29. St. Thomas Risk Assessment Tool (STRATIFY)
30. Timed Up and Go Test
31. Tinetti Performance-Oriented Mobility Assessment (POMA)
32. World Health Organization Quality of Life (WHOQoL)

## **Outcome Measures Studied in Outpatient Setting**

- 1.** Alternate Step Test (Step Test)
- 2.** Balance Evaluation System Test (BESTest; BESTmini; BESTbrief)
- 3.** Balance Outcome Measure for Elder Rehabilitation (BOOMER)
- 4.** Berg Balance Scale
- 5.** Brunel Balance Assessment
- 6.** Canadian Occupational Performance Measure (COPM)
- 7.** Clinical Test of Sensory Interaction and Balance (CTSIB)
- 8.** Community Balance and Mobility Scale
- 9.** CONFbal Scale of Balance Confidence
- 10.** Dynamic Gait Index
- 11.** Euroqual
- 12.** Fall Perception Questionnaire
- 13.** Fear Avoidance Beliefs Questionnaire (FABQ)
- 14.** Figure 8 Walking Test
- 15.** Fullerton Advanced Balance Scale (FAB)
- 16.** Functional Gait Assessment
- 17.** Functional Reach Test
- 18.** Gait Speed
- 19.** Grip Strength
- 20.** Hauser Ambulation Index
- 21.** L Test of Functional Mobility
- 22.** Physiological Profile Assessment
- 23.** Rivermead Mobility Index
- 24.** Short Physical Performance Battery (SPPB)
- 25.** Shuttle Walk
- 26.** Sickness Impact Profile Physical Dimension
- 27.** Single Leg Stance (Single Limb Standing)
- 28.** The Obstacle Course
- 29.** Timed Up and Go Test
- 30.** Tinetti Performance-Oriented Mobility Assessment (POMA)
- 31.** World Health Organization Quality of Life (WHOQoL)



## **Outcome Measures Studied in Home Health Setting**

1. Balance Evaluation System Test (BESTest; BESTmini; BESTbrief)
2. Balance Outcome Measure for Elder Rehabilitation (BOOMER)
3. Berg Balance Scale
4. Fall Risk for Older People in the Community Assessment
5. Figure 8 Walking Test
6. Home Falls and Accidents Screening Tool (HomeFast)
7. Missouri Alliance for Home Care (MAHC-10)
8. Single Leg Stance (Single Limb Standing)

## **Outcome Measures Studied in Long Term Care and Residential Care Facility Setting (Nursing Home, Personal Care, Assisted Living, etc.; excluding Independent Living)**

1. Activities Specific Balance Confidence Scale
2. Bed Rise Difficulty (BRD) Scale
3. Berg Balance Scale
4. Downton Fall Risk Index
5. Elderly Mobility Scale (EMS)
6. Gait Speed
7. Hauser Ambulation Index
8. Melbourne Fall Risk Assessment Tool (MFRAT)
9. Mobility Interaction Fall Chart
10. Morse Fall Scale
11. Peninsula Health Fall Risk Assessment Tool (PHRAT)
12. Physiological Profile Assessment
13. Queensland Fall Risk Assessment Tool (QFRAT)
14. Short Physical Performance Battery (SPPB)
15. Sickness Impact Profile Physical Dimension
16. Single Leg Stance (Single Limb Standing)
17. St. Thomas Risk Assessment Tool (STRATIFY)
18. Subjective Risk Rating of Specific Tasks
19. Survey of Activities and Fear of Falling in the Elderly

## Summary Tables of Each Individual Outcome Measure

### Legend for Tables:

NA = Not assessed

MDC = Minimum Detectable Change

y/o = years old

s/p = after

Sn = Sensitivity

Sp = Specificity

PPV = Positive Predictive Value

NPV = Negative Predictive

Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>2 Minute Walk Test</b>	Pin et al., 2014	Systematic Review, 25 studies were included; 24 of them were adult population; one was pediatric population	NA	Moderate to strong evidence to support the 2MWT as a reliable, valid, and responsive outcome measure for adults with lower limb amputation and for frail elderly patients. Important psychometric information on the 2MWT such as minimal clinically important changes and normative data is still missing. At present, any changes in the 2MWT should be interpreted with caution.	NA	NA	NA	NA	NA	NA
	Bohannon et al., 2015	Community-dwelling adults (age 18-85 y/o, n=1137)	NA	ICC 0.82	42.5m	NA	NA	NA	NA	NA

### References:

1. Pin TW. Psychometric properties of 2-minute walk test: a systematic review. *Arch Phys Med Rehabil.* 2014;95:1759-75.
2. Bohannon RW, Wang YC, Gershon RC. Two-minute walk test performance by adults 18 to 85 years: normative values, reliability, and responsiveness. *Arch Phys Med Rehabil.* 2015;96 (3):472-7.

Outcome Measure	Reference	Population/Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>21 Item Fall Risk Index</b>	Ishimoto et al., 2012	Community-dwelling adults (mean age 74.6 y/o, n=518)	NA	NA	NA	≥ 10 items significantly differentiated fallers and non-fallers	44%	90%	NA	NA

**References:**

1. Ishimoto Y 1 , Wada T, Kasahara Y, et al. Fall Risk Index predicts functional decline regardless of fall experiences among community-dwelling elderly. *Geriatr Gerontol Int.* 2012;12(4):659-66.

Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>25 Question Geriatric Locomotive Function Scale</b>	Seichi et al., 2012	Community-dwelling adults in Japan (age 77±6 y/o, n=711)	NA	Test-retest ICC (range 0.712–0.924).	NA	16 points for identifying locomotive syndrome	NA	NA	NA	NA
	Seichi et al., 2014	Community-dwelling adults in Japan (age range 65-96 y/o, n=880)	NA	NA	NA	16 points	69%	65%	NA	NA
	Tavares et al., 2017	Community-dwelling adults (82±1.5 y/o; n=100)	high internal consistency value Cronbach's alpha=0.94	Interobserver and intra-rater ICC of 97.6% and 98.4%, respectively	NA	NA	NA	NA	NA	NA
	Kimura et al., 2018	Older adults with cervical myelopathy (mean age 67.2 ± 11.7 y/o; n=360)	NA	NA	NA	16 points yielded the AUC of 0.674, to differentiate recurrent fallers from non-recurrent fallers.	NA	NA		NA

**References:**

1. Seichi A 1 , Hoshino Y, Doi T, et al . Development of a screening tool for risk of locomotive syndrome in the elderly: the 25-question Geriatric Locomotive Function Scale. *J Orthop Sci.* 2012;17(2):163-72.
2. Seichi A 1 , Hoshino Y, Doi T, et al . Determination of the optimal cutoff time to use when screening elderly people for locomotive syndrome using the one-leg standing test (with eyes open). *J Orthop Sci.* 2014;19(4):620-6.
3. Kimura A, Takeshita K, Hirokazu, Seichi A, et al. The 25-question Locomotive Function Scale predicts the risk of recurrent falls in postoperative patients with cervical myelopathy. *J Orthop Sci.* 2018; 23 (1): 185-189.

Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>30 Seconds Chair Stand Test (30 Seconds Sit to Stand)</b>	Rikli et al., 1999	Community-dwelling older adults (60-94 y/o; n=2140)	Criterion validity of the chair stand compared to weight adjusted leg press performance for all participants: $r = 0.77$ , 95% CI = 0.64-0.85	Test-retest: $r = 0.89$ (95% CI 0.79-0.93) interrater reliability $r = 0.95$ (95% CI 0.84-0.97)	NA	.	NA	NA	NA	NA
	Cho et al., 2012 (added additional data by Lusardi et al., 2017)	Older adults from outpatient of the university hospital (69.8±5.3 y/o; n=86)	NA	NA	NA	15	65%	84%	NA	NA
	Yamada et al., 2015	Community-dwelling older adults in Japan (76±6 y/o; n=157)	OR to fall prediction = 1.03	NA	NA	NA	NA	NA	NA	NA
	Zanini et al., 2018	Moderate-to-severe COPD patients were included (55-86 y/o; n=96)	Significantly correlated to distance at 6MWT (6MWD) ( $r=0.65$ ; $p<0.0001$ )	NA	2 reps	NA	NA	NA	NA	NA

**References:**

1. Rikli E, Jones CJ, Development and validation of a functional fitness test for community-residing older adults. *J Aging and Phys Act.* 1999;7(2):129-161.
2. Cho KH, Bok SK, Kim YJ, Hwag SL . Effect of lower limb strength on falls and balance of the elderly. *Ann Rehabil Med.* 2012;36(3):386-93.
3. Lusardi MM, Fritz S, Middleton A, Allison L, Wingood M, Phillips E, Criss M, Verma S, Osborne J, Chui KK. Determining risk of falls in community dwelling older adults: A systematic review and meta-analysis using posttest probability. *J Geriatr Phys Ther.* 2017;40(1):1-36.
4. Yamada T, Demura S. Effectiveness of Sit-to-stand Tests for Evaluating Physical Functioning and Fall Risk in Community-dwelling Elderly. *Hum Perform Measure.* 2015;12:1-7.
5. Zanini A, Crisafulli E, D'Andria M, et al. Minimal clinically important difference in 30 second sit-to-stand test after pulmonary rehabilitation in patients with COPD. *Eur Respir J.* 2018;52(suppl 62).

Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>360 Degree Turn Time</b>	Dite et al., 2002	Community-dwelling older adults Non-fallers (age 71±9.3 y/o; n=372) Fallers (age 75±11 y/o; n=139)	NA	Inter-rater reliability: Kappa=0.96 Intra-rater reliability: Kappa=0.92 Re-test reliability: Kappa=0.91	NA	4 steps	92%	70%	NA	NA
				Inter-rater reliability: kappa=0.97 Intra-rater reliability: kappa=0.99 Re-test reliability: Kappa=0.90		2.1 seconds	81%	89%		
	Schenkman et al., 2011	Patients with Parkinson's Disease (age information not available; n=150)	NA	Test-retest reliability: seconds: ICC = 0.77 steps: ICC = 0.80	NA	NA	NA	NA	NA	NA
	Shiu et al., 2016	Stroke survivors (55 y/o or older, detailed age information not available; n=72) and healthy group (n=35)	NA	Excellent intra-rater, interrater, and test-retest reliability (ICC=.824-.993)	NA	Affected side: 0.76 seconds  Unaffected side: 1.22 seconds	84%  84%	91%  89%	NA	NA

**References:**

1. Dite W, Temple VA. Development of a Clinical Measure of Turning for Older Adults. *Am J Phys Med Rehab.* 2002; 81 (11): 857-866
2. Schenkman M, Ellis T, et al. Profile of functional limitations and task performance among people with early- and middle-stage Parkinson disease." *Phys Ther.* 2011; 91(9):1339-54.
3. Shiu C, Ng S, Kwong P, Liu T, et al. Timed 360° Turn Test for Assessing People With Chronic Stroke. *Arch Phys Med Rehabil.* 2016;97(6):536-44.



Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>4 Square Step Test</b>	Dite et al., 2002	Community-dwelling adults (63.1±6.3 y/o; n=10)	Strong correlations with the TUG and Step Test. The lower correlations found between the FSST and FRT	Interrater: ICC=0.99 Re-test: ICC=0.98	NA	> 15 seconds	85%	100%	100	86
	Dite et al., 2007	Community-dwelling fallers (65.2±11.2 y/o; n=13) and non-fallers (59.9±14.3 y/o; n=27) s/p Unilateral Transtibial Amputation	NA	NA	NA	24 seconds	92%	93%	NA	NA
	Whitney et al., 2007	Patients with vestibular symptoms who were rolled into physical therapy (63.7±17.8 y/o; n=32)	Good correlations with the other gait measures (correlation coefficients for the TUG, .69; gait speed, .65; DGI, -.51) and poor correlations with the DHI and the ABC (DHI, -.13; ABC, -.12)	IC=9.93; 95CI 0.86–0.96	NA	12 seconds	80%	92%	NA	NA
	Blennerhassett et al., 2008	Older adults who could walk at least 50m with minimal assistance at rehab hospital (23-75 y/o; n=37)	Strong inverse relationship with step test: spearman $\rho$ =-0.73 to -0.86	Inter-rater reliability: 0.94–0.99	NA	15 seconds	NA	NA	NA	NA
	Duncan et al., 2013	Individuals with idiopathic Parkinson's Disease (70±7.4 y/o; n=53)	NA	Interrater ICC = 0.99 Test-retest reliability ICC = 0.78	NA	9.68 seconds	73%	57%	31% from 21%	NA

	Goh et al., 2013	Community-dwelling older adults with chronic stroke (57.7±8.2 y/o; n=15) and healthy control (57.3±3.6 y/o; n=15)	Correlation with TUG scores $r=.59$ ; $P=.02$	Intra-rater reliability: 0.82-0.83 Interrater reliability $>.99$	NA	11 seconds	73.3%	93.3%	NA	NA
	Wagner et al., 2013	Patients with relapsing-remitting, secondary progressive, and primary progressive Multiple Sclerosis (41.6±9.8 y/o; n=25)	Excellent correlations between the FSST and BBS ( $r_s = -0.84$ , $P<0.001$ ), DGI ( $r_s = -0.81$ , $P<0.001$ ), and ABC ( $r_s = -0.78$ , $P<0.001$ ). The FSST was also moderately correlated with EDSS scores ( $r_s=0.73$ , $P<0.001$ ).	Test-retest, reliability: 0.922 (0.831–0.965)	4.6 seconds	NA	NA	NA	NA	NA
	Batting et al., 2019	Participants scheduled to receive hip replacement surgery (70.6±7.1 y/o; n=58)	negative correlations with BBS ( $r = -0.6$ ,	Inter-rater agreement mean difference of 0.6 seconds	NA	NA	NA	NA	NA	NA

### References:

1. Dite W, Temple VA: Development of a clinical measure of turning for older adults. *Am J Phys Med Rehabil.* 2002;81:857–866.
2. Dite W, Connor HJ, Curtis HC. Clinical identification of multiple fall risk early after transtibial amputation. *Arch Phys Med Rehabil.* 2007;88:109-14.
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5. Duncan RP, Earhart GM. Four Square Step Test performance in people with Parkinson Disease. *J Neurol Phys Ther.* 2013;37:2-8.
6. Goh EY, Chua SY, Hong S et al. Reliability and concurrent validity of Four Square Step Test scores in subjects with chronic stroke: a pilot study. *Arch Phys Med Rehabil.* 2013;94:1306-11.
7. Wagner JM, Norrisa RA, VanDillen LR. Four Square Step Test in ambulant persons with multiple sclerosis: validity, reliability, and responsiveness. *Int J Rehabil Res.* 2013;36(3):253-9.
8. Batting M, Barker KL. Reliability and validity of the Four Square Step Test in patients with hip osteoarthritis before and after total hip replacement. *Physiother.* 2019;105(2):244-53.

Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>5 Times Sit to Stand (10 Times follows)</b>	Whitney et al., 2005	Subjects with balance disorder (47 young subjects 14-59 y/o; 46 old subjects 61-90 y/o), and control group (32 young 23-57 y/o; 49 old 63-84 y/o)	The Spearman rho against the DGI was $-.68$ (P.001); against the ABC was $-.58$ (P.001)	NA	NA	13 seconds	66%	67%	61%	54%
	Tiedemann et al., 2008 (added additional data by Lusardi et al., 2017)	Community-dwelling older adults (age 74-98 y/o; n = 362)	NA	ICC 0.89 (95% CI = 0.79-0.95)	NA	$\geq 12$ seconds	66%	45%	NA	NA
	Buatois et al., 2008	Community-dwelling older adults ( $70 \pm 4$ y/o; n=2375) in France.	NA	NA	NA	12 seconds Risk Ratio 1.74, CI=1.24-2.45, P<.001	55%	65%	NA	NA
	Buatois et al., 2010 (added additional data by Lusardi et al., 2017)	Community-dwelling older adults ( $70 \pm 4.1$ y/o; n=1618) in France	NA	NA	NA	12 seconds Risk Ratio 1.74, CI=1.24-2.45, P<.001	60%	64%	NA	NA
	Bohannon et al., 2011	Systematic Review included multiple articles; community-dwelling older adults (age >65 y/o; n=779)	NA	ICCs ranged from 0.64 to 0.96. The adjusted mean ICC calculated from the reported ICCs was 0.81	NA	NA	NA	NA	NA	NA
	Wallmann, et al., 2012	Community-dwelling older adults (51-91 y/o; n=93)	NA	Excellent interrater reliability among all three researchers: ICC = 1.000.	NA	NA	NA	NA	NA	NA

	Zhang, et al., 2013	Community-dwelling older adults (70.8±5.3 y/o; n=562)	NA	NA	NA	Those who require > 16.6 seconds to finish 5TSTS have significantly higher likelihood of developing IADL-related disability at 3 years follow-up	NA	NA	NA	NA
	Lusardi et al., 2017 (Systemic Review)	Community-dwelling older adults (age >65 y/o)	NA	NA	NA	>12 seconds	59%	63%	NA	NA
	Medina-Mirapeix, et al., 2018	Community-dwelling older adults s/p unilateral Total Knee Replacement (72.1±10.1 y/o; n=24)	NA	ICC for inter-observer reliability of the 5STS were 0.998 for men and women combined. For test-retest 0.982	NA	NA	NA	NA	NA	NA
	Cani et al., 2020	Community Patient with severe COPD (68.3 ± 7.9 y/o; n=28) and healthy control (67.2 ± 8.2 y/o; n=17)	NA	Test-retest ICC = 0.79 (95%CI: 0.02-0.93; < 0.001)	NA	NA	NA	NA	NA	NA
<b>10 Time Sit to Stands</b>	Bohannon et al., 2006 (Meta-analysis)	Healthy older adults from 14 studies (>60 y/o)	NA	NA	NA	60-69 11.4seconds 70-79 12.6seconds 80-89 12.7seconds	NA	NA	NA	NA
	Segura-Ortí, et al., 2011	Adults undergoing hemodialysis (60.3±15.8 y/o; n=39)	NA	Test-retest ICC 0.88	8.4 second s; STS 10	NA	NA	NA	NA	NA

**Note:** Since this outcome measure was developed, there have been several articles that reported data on areas of reliability, validity, etc. The older publications are not listed in this summary table, as this Toolkit focuses on recent articles. For further research, the Taskforce members suggest reading the earlier articles.

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Activity-Based Balance and Gait</b>	Topper et al., 1993	Community volunteers with 17 men and 83 women (age range 62-96 y/o) who can perform ADL independently	At one year follow-up, the score of fallers are significantly poorer than those of non-fallers.	NA	NA	NA	NA	NA	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Activities Specific Balance Confidence Scale (ABC)</b>	Powell et al., 1995	Community seniors (age range 65-95 y/o; n=60)	Correlation with Physical Self Efficacy Scale ( $r = .63, p < .001$ ) and with FES ( $r = -.54, p < .001$ ),	Internal consistency: Cronbach's alpha = .96	NA	NA	NA	NA	NA	NA
	Payne et al., 2003 (added additional data by Lusardi et al., 2017)	Community older adults in rural ( $75.5 \pm 7.7$ y/o; n=40) and urban ( $76.0 \pm 7.3$ y/o; n=75) in Canada	NA	NA	NA	60	35%	88%	NA	NA
	Lajoie et al., 2004	Community-dwelling older adults fallers ( $75.5 \pm 3.1$ y/o; n=45) and non-fallers ( $73.8 \pm 2.8$ y/o; n=80)	NA	NA	NA	<67	89%	96%	NA	NA
	Steffen et al., 2008	Community-dwelling adults with Parkinson's Disease (mean age=71 y/o; n=37)	NA	Test-retest reliability 0.90	13	NA	NA	NA	NA	NA
	Mak et al., 2009	Community adults with Parkinson's Disease ( $62.3 \pm 7.1$ y/o; n=71) and healthy participants ( $65.6 \pm 7.6$ y/o; n=49)	NA	NA	NA	<67	93%	69%	NA	NA
	Sakakibara et al., 2011	Unilateral lower limb amputation for at least 6 months ( $68.1 \pm 10.3$ y/o; n=448)	NA	ICC=0.93 Test-re-test $r = 0.84-0.95$	NA	NA	NA	NA	NA	NA
	An et al., 2017	Chronic stroke survivors, who have ability to ambulate > 10m without walking aide ( $70.1 \pm 10.1$ ; n=43)s	NA	NA	NA	81	71%	72%	NA	NA

	Park et al., 2018	Community-dwelling hemiplegic stroke patients in Korea Fallers (64.8±9.8 y/o; n=35) Non-fallers (62.8±8.6 y/o; n=64)	NA	NA	NA	63 AUC=0.69	41%	92%	NA	NA
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**Note:** Since this outcome measure was developed, there have been several articles that reported data on areas of reliability, validity, etc. The older publications are not listed in this summary table, as this Toolkit focuses on recent articles. For further research, the Taskforce members suggest reading the earlier articles.

**Note:** This outcome measure is also validated in languages addition to English.

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
Activities Specific Fall Caution Scale	Blanchard et al., 2007	Seniors residing in nursing homes or assistive living facility (mean age 50.5 y/o; n=50)	Convergent validity: with functional measures (TUG, Berg, etc.); Discriminant validity (with or without walking aid): $p < 0.05$	Test-retest: ICC <sub>(2,1)</sub> = .87; 95% CI, .78–.93	NA	NA	NA	NA	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
Alternate Step Test	Tiedemann et al., 2008	Community-dwelling adults (age 74-98 y/o; n = 362)	NA	ICC 0.78 (95% CI = 0.59, 0.89)	NA	≥ 10 seconds	69%	56%	NA	NA
	Chung et al., 2014	Community adults after stroke (60.4±5.5; n=45) and healthy adults (61.6±5.2 y/o; n=41)	NA	Inter-rater (ICC= 0.991– 0.999), intra-rater (ICC= 0.946– 0.955) and test-retest reliability (ICC= 0.909–0.952) of the AST times for the participants with stroke	3.26 seconds	NA	NA	NA	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Balance Evaluation System Test (BESTest)</b>	Horak et al., 2009	Adults with neurological disorders (75.0±7.6 y/o; n=22); testers are therapists, students, and researchers (n=19)	With Activities Specific Balance Confidence Scale (ABC) r=.69	Interrater: BESTest (ICC = .91) Components (.79-.96); n = 22	NA	NA	NA	NA	NA	NA
	Leddy et al., 2011	Adults with Parkinson's Disease (>40 y/o; no further age description; n=20)	With Berg Balance Scale (BBS); r=.87	Interrater: BESTest [ICC (2, 1) = .96]; component (.79-.96); n = 15; Test-retest: BESTest [ICC (2, 1) = .88]; component (.63-.87); n = 24	NA	NA	NA	NA	NA	NA
	Padgett et al., 2012	13 adults with and 20 adults without Multiple Sclerosis (50-83 y/o)	NA	Interrater: BESTest: ICC =.99; No component reported	NA	77 (raw score)	86%	95%	NA	NA
	Duncan et al., 2013	Participants with Parkinson's Disease, (68.2±9.3 y/o; n=80); Retrospective 6 month; Prospective 6 month: Prospective 12 month	NA	NA	NA	69 (calculated in %)	Retrospective 6 month: 84%; Prospective 6 month: 93%; Prospective 12 month: 46%	Retrospective 6 month: 76%; Prospective 6 month: 84%; Prospective 12 month: 74%	NA	NA

	O'Hoski et al., 2014	Healthy adults (68.7±10.6 y/o; n=79)	NA	NA	NA	Mean 95.7 for 50 to 59, 91.4 for aged 60 to 69, 85.4 for 70 to 79, and 79.4 for 80 to 89 (raw score)	NA	NA	NA	NA
	Rodrigues et al., 2014	Adults with hemiparesis (61.1 ±7.5 y/o; n=16)	Against ABC r=.59 and BBS r=.78	Interrater: BESTest [ICC(?) = .93]; component (.85-.96); n = 16 Test-retest: BESTest [ICC = .98]; component (.71-.94); n = 16	NA	NA	NA	NA	NA	NA
	Chinsongkram et al., 2014	Adults with subacute stroke (mean age 58.2; 24-90 y/o; n=12)	With BBS (r=.96)	Interrater: BESTest [ICC <sub>(3, 1)</sub> = .99]; No component results reported; n = 12 Test-retest: BESTest [ICC <sub>(2, 1)</sub> = .96]; No component results reported; n = 12	NA	NA	NA	NA	NA	NA
	Chan et al., 2015	Patients after total knee arthroplasty (age 50-85 y/o; n=46)	(n = 46) Internal consistency $\alpha$ =0.98; validated against BBS, Functional Gait Assessment (FGA), and ABC Scale	Interrater: BESTest [ICC <sub>(2, 1)</sub> = .99]; Component (.98-1.00); n = 25 Test-retest: BESTest [ICC <sub>(2, 1)</sub> = .96]; Component (.76-.96); n = 45	BESTest MDC = 6.2% Component: 22.71%; n = 46	NA	NA	NA	NA	NA

	O'Hoski et al., 2015	Healthy adults (68.7±10.6 y/o; n=79)	ABC Scale $r = 0.62-0.67$ TUG $r = -0.60$ to $-0.68$ , PASE $r = 0.33-0.40$ , SLS $r = 0.67-0.77$	NA	NA	NA	NA	NA	NA	NA
	Chinsongkram et al., 2016	Adults with subacute stroke (mean age 58.2 y/o; 24-90 y/o; n=49)	NA	NA	NA	10% of balance improvement	80.8%	87.5%	NA	NA
	Huang et al., 2016	Community-dwelling cancer survivors (68.4±8.1 y/o; n=28)	ABC ( $r=.73$ )	Interrater: BESTest [ICC <sub>(2,1)</sub> = .96]; No component results reported; Test-retest: BESTest [ICC <sub>(2,1)</sub> = .92]; No component results reported	BESTest MDC = 6.9%; No component results reported	NA	NA	NA	NA	NA
	Jacome et al., 2016	Participants with COPD (75.9±7.1 y/o; n=46)	Against ABC ( $\rho = 0.61$ )	Interrater: BESTest [ICC <sub>(2,1)</sub> = .85]; No component results reported; Intrarater: BESTest [ICC <sub>(2,1)</sub> = .87]; No component results reported	6.3%	76.9 (calculated in %)	64%	77%	NA	NA
	Yingyongyudha et al., 2016	Healthy adults with or without fall hx, (70.2±7.0 y/o; n=200)	NA	NA	NA	66 (calculated in %)	76%	50%	NA	NA

	Anson et al., 2017	Adults with fall history and self-reported balance problem, (78.1±7.0 y/o; n=58)	NA	Test-retest: 0.86	8.9	NA	NA	NA	NA	NA
	Margues et al., 2017	Adults with Type II Diabetes Mellitus (75±7.6 y/o; n=66)	Against ABC (rho = 0.70)	NA	NA	81 (raw score)	68%	71%	NA	NA
	Wang-Hsu et al., 2018	Community-dwelling older adults (85±5.5 y/o; n=70)	NA	Interrater: BESTest [ICC (2, 1) = .97]; Component (.85-.94); N = 32 Test-retest: BESTest [ICC (2, 1) = .93]; Component (.72-.89); N = 70	BESTest MDC = 8.2-point (95%CI) Component: 2.1-3.4 point (95%CI); N = 70	NA	NA	NA	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>BESTest-mini</b>	Franchignoni et al., 2010	Adults with neurological disorders (62.7±16 y/o; n=115)	Using Rasch analysis to select 14 items	NA	NA	NA	NA	NA	NA	NA
	King et al., 2012	Adults with Parkinson's Disease (65±7.1 y/o; n=97)	highly correlated with the BBS (r = 0.79)	NA	NA	NA	NA	NA	NA	NA
	Padgett et al., 2012	13 adults with and 20 adults without Multiple Sclerosis (age range 50-83 y/o)	NA	Interrater: ICC = .99	NA	NA	71%	100%	NA	NA
	Mak et al., 2013	Adults with Parkinson's Disease, (63.5±9.3 y/o; n=110)	NA	NA	NA	19	79% for predicting future falls	NA	NA	NA
	Tsang et al., 2013	106 post stroke (57.1±11.0 y/o) and 48 control adults participated (60.2±9.3 y/o)	Against BBS (rho = 0.83)	Interrater: ICC <sub>(2, 1)</sub> = .97 Test-retest: ICC <sub>(3, 1)</sub> = .96; n =22	3 point	17.5	64.0%	64.2%	NA	NA
	Duncan et al., 2013	Participants with Parkinson's Disease, (68.2±9.3 y/o; n=80); also reported Retrospective 6 month; Prospective 6 month; and Prospective 12 month LR+, LR-, pretest probability of falling, 6 month posttest probability, and 12 month posttest probability of falling	NA	NA	NA	20/32	Retrospective 6 month: 88%; Prospective 6 month: 86%; Prospective 12 month: 62%	Retrospective 6 month: 78%; Prospective 6 month: 78%; Prospective 12 month: 74%	NA	NA



	Godi et al., 2013	Participants with various neurological disorders (66.2±13.2 y/o; n=93)	Correlated to BBS	Cronback $\alpha=0.90$ ; Interrater: ICC <sub>(2, 1)</sub> = .98; Test-retest: ICC <sub>(2, 1)</sub> = .96	3.5	NA	94%	81%	NA	NA
	Chinsongkram et al., 2014	Adults with subacute stroke (57.01 ±12.23 y/o; n=70)	NA	NA	3 points	21	84.6%	87.5%	NA	NA
	Chan et al., 2015	Patients after total knee arthroplasty (age range 50-85 y/o; n=46)	(n = 46) Internal consistency $\alpha=0.96$ ; validated against BBS, Functional Gait Assessment (FGA), and ABC Scale	Interrater: [ICC <sub>(2, 1)</sub> = .96] Test-retest: [ICC <sub>(2, 1)</sub> = .92]; n = 45	MDC = 3.71 point; n = 46	NA	NA	NA	NA	NA
	Jacobs et al., 2015	Adults with Parkinson's Disease (mean age 67 y/o, 64-70; n=42)	NA	NA	NA	21	82.4%	65.4%	NA	NA
	Benka Wallen et al., 2016	Adults with Parkinson's Disease (72.8±5.5 y/o; n=112)	Structure validity with exploratory factor analysis (EFA) and Rasch analysis; recommend omit item 7	NA	NA	NA	NA	NA	NA	NA
	Ross et al., 2016	Adults with Multiple Sclerosis (45.7±5.7 y/o; n=52)	With BBS (r=.79)	None reported	None reported	22.5 cutoff for falls; AUC = 0.77,	NA	NA	NA	NA

	Huang et al., 2016	Community-dwelling cancer survivors (68.4±8.1 y/o; n=28)	ABC (r=.52)	Interrater: [ICC <sub>(2,1)</sub> = .86]; Test-retest: [ICC <sub>(2,1)</sub> = .90];	MDC = 2.39 point	NA	NA	NA	NA	NA
	Jacome et al., 2016	Participants with COPD (75.9±7.1 y/o; n=46)	Against ABC (rho = 0.55)	Interrater: [ICC <sub>(2,1)</sub> = .85]; Intrarater: [ICC <sub>(2,1)</sub> = .88];	MDC = 3.3	21.5	68%	65%	NA	NA
	Schlenstedt et al., 2016	Adults with Parkinson's Disease; 33 fallers (68.1±7.5 y/o) and 33 non-fallers (66.0±11.6 y/o)	NA	NA	NA	19	0.52%	0.70%	NA	NA
	Yingyongyudha et al., 2016	Healthy adults with or without fall history (70.2±7.0 y/o; n=200)	NA	NA	NA	16	85%	75%	NA	NA
	Anson et al., 2017	Adults with fall history and self-reported balance problem, (78.1±7.0 y/o; n=58)	NA	Test-retest: 0.84	4.0	NA	NA	NA	NA	NA
	Jorgensen et al., 2017	Ambulatory adults with chronic spinal cord injury (55±17 y/o; n=46)	Correlates to BBS (r=0.90)	NA	NA	19	55-82%	54-75%	NA	NA
	Margues et al., 2017	Adults with Type II Diabetes Mellitus (75±7.6 y/o; n=66)	Against ABC (rho = 0.63)	NA	NA	20.5	60%	71%	NA	NA
	Pereira et al., 2019	Adults with COPD from clinic (67±9.3 y/o; n=67) in Brazil	NA	NA	NA	22.5	6 mon 85.7% 12 mon 84%	6 mon 66.7% 73.8%	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>BESTest-Brief</b>	Padgett et al., 2012	Adults with and 20 adults without Multiple Sclerosis (age range 50-83 y/o; n=13)	NA	Interrater: ICC = .99	NA	NA	100%	100%	NA	NA
	Duncan et al., 2013	Participants with Parkinson's Disease, (68.2±9.3 y/o; n=80); also reported Retrospective 6 month; Prospective 6 month: and Prospective 12-month LR+, LR-, pretest probability of falling, 6 month posttest probability, and 12 month posttest probability of falling	NA	NA	NA	11/24 (45.8%)	Retrospective 6 month: 76%; Prospective 6 month: 71%; Prospective 12 month: 53%	Retrospective 6 month: 84%; Prospective 6 month: 87%; Prospective 12 month: 93%	NA	NA
	Chan et al., 2015	Patients after total knee arthroplasty (age range 50-85 y/o; n=46)	(n = 46) Internal consistency $\alpha=0.97$ ; validated against Berg Balance Scale, Functional Gait Assessment (FGA), and Activities-specific Balance Confidence (ABC) Scale	Interrater: [ICC <sub>(2, 1)</sub> = .97]; n = 25 Test-retest: [ICC <sub>(2, 1)</sub> = .94]; n = 45	MDC = 3.2 point; n = 46	NA	NA	NA	NA	NA
	Jacobs et al., 2015	Adults with Parkinson's Disease (mean age 67 y/o, 64-70; n=42)	NA	NA	NA	14	70.6%	76.9%	NA	NA

	Bravini et al., 2016	Adults with balance disorders (65.3±14.9 y/o; n=244)	Internal construct validity using Rasch analysis demonstrated un-fit model, recommend item 1 not fit	Cronbach $\alpha=0.89$ ; Interrater: ICC <sub>(2, 1)</sub> = .90; Test-retest: ICC <sub>(2, 1)</sub> = .94	4.3	NA	NA	NA	NA	NA
	Huang et al., 2016	Community-dwelling cancer survivors (68.4±8.1y/o; n=28)	ABC (r=.81)	Interrater: [ICC <sub>(2, 1)</sub> = .92]; Test-retest: [ICC <sub>(2, 1)</sub> = .94];	MDC = 2.55 point	NA	NA	NA	NA	NA
	Jacome et al., 2016	Participants with COPD (75.9±7.1 y/o; n=46)	Against ABC (rho = 0.53)	Interrater: [ICC <sub>(2, 1)</sub> = .97]; Intra-rater: [ICC <sub>(2, 1)</sub> = .82];	MDC = 4.9	16.5	81%	73%	NA	NA
	Margues et al., 2017	Adults with Type II Diabetes Mellitus, (75±7.6 y/o; n=66)	Against ABC (rho = 0.62)	NA	NA	15.5	67%	71%	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Balance Outcome Measure for Elder Rehabilitation (BOOMER)</b>	Haines et al., 2007	Australian adults in 2 states received PT services at inpatient, outpatient, and homecare (74.0±14.0 y/o; n=1769)	Construct validity with Modified Elderly Mobility Scale (MEMS), ( $\rho = .88$ )	Cronbach $\alpha$ : .87-.89	NA	NA	NA	NA	NA	NA
	Kuys et al., 2011	Australian rehab inpatient geriatric unit patients (78±11 y/o; n=134)	Concurrent validity with Berg ( $\rho = .91$ ; $P < .01$ ) with gait speed ( $\rho = .67$ ; $P < .01$ )	NA	NA	NA	NA	NA	NA	NA
	Kuys et al., 2014	Acute inpatients followed 6 months after discharge (77±7 y/o; n=44)	highly associated with BBS scores ( $r = .93$ , $p < 0.001$ )	NA	NA	NA	NA	NA	NA	NA
	Brown et al., 2019	Community-dwelling women with osteoporosis and non-traumatic T4-L4 vertebral fracture (76.4±6.9 y/o; n=144).	moderate concurrent validity with SPPB (Spearman $\rho = 0.72$ ; $P < .01$ )	modest internal consistency (Cronbach $\alpha = 0.620$ ) Note: Substantial ceiling effect for those not using an assistive device.	NA	NA	NA	NA	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Balance Self-Perception Test</b>	Shumway-Cook et al., 1997 (added additional data by Lusardi et al., 2017)	Community-dwelling older adults (age range 62-97 y/o; n=105)	NA	NA	NA	<50	73%	82%	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Bed Rise Difficulty Scale</b>	Alexander, et al., 1992	Women 3 groups: Young n=17, (mean age 24 y/o), Community-dwelling n=12, (mean age 71 y/o), Assisted living n=15. (mean age 86 y/o)	NA	NA	NA	0-10 Min difficulty, 11-20 Mod difficulty, 21-30 severe difficulty	NA	NA	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Berg Balance Scale</b>	Downs et al., 2013	Systematic review included subjects from 11 studies (age range 42-85 y/o; n=668)	NA	0.98 (95% CI 0.97 to 0.99)	NA	NA	NA	NA	NA	NA
	Godi et al., 2013	Participants with various neurological disorders (66.2±13.2 y/o; n=93)	With scores of Mini-BESTest at baseline and follow-up: r= 0.85	Test-retest reliability: ICC= 0.92 (95% CI .87-.97) Inter-rater reliability: ICC= 0.97 (95% CI .96-.99)	MDC= 6.2 (SEM= 2.18)	NA	77%	97%	NA	NA
	Major et al., 2013	Participants with lower extremity amputation (54±12 y/o; n=30)	NA	Inter-rater reliability: ICC= 0.94	NA	NA	NA	NA	NA	NA
	Wong et al., 2014	Individuals with lower limb amputations (53.0±15.7 y/o; n=5)	NA	Inter-rater reliability: ICC= 0.99 (95% CI .99-1.00) Intra-rater reliability: ICC= 0.99 (95% CI .96-1.00)	NA	NA	NA	NA	NA	NA
	Dadgari et al., 2015	Community dwelling older adults (71.5 ± 9.3 y/o; n=455)	NA	NA	NA	NA	63%	97%	NA	NA



	Chan et al., 2015	Patients after total knee arthroplasty (age range 50-85 y/o; n=92)	At 2 weeks post-op: With FGA: $r = 0.67$ With BESTest: $r = 0.78$ With Mini-BESTest: $r = 0.72$ With BriefBESTest: $r = 0.74$ At 12 weeks post-op: With FGA: $r = 0.51$ With BESTest: $r = 0.68$ With Mini-BESTest: $r = 0.58$ With BESTest Brief: $r = 0.64$ At 24 weeks post-op: With FGA: $r = 0.43$ With BESTest: $r = 0.64$ With Mini-BESTest: $r = 0.55$ With BESTest Brief: $r = 0.71$	Inter-rater reliability: ICC= 0.98 (95% CI 0.97-0.99)	MDC= 2.00 (SEM= 0.72)	NA	NA	NA	NA	NA
	Telenius et al., 2015	Nursing home patients with mild to moderate dementia (82.7±7.2 y/o; n=33), 2 testers	NA	Inter-rater reliability: ICC= 0.99	MDC= 1.92 (SEM= 0.97)	NA	NA	NA	NA	NA
	Pickenbrock et al., 2016	Patients with acute stroke (70±11 y/o; n=53)e	With Static Balance test: $r = 0.91$	Inter-rater reliability: ICC= 0.87	NA	NA	NA	NA	NA	NA
	Schlenstedt et al., 2016	Patients with Parkinson's Disease (33 fallers 68.1±7.5 y/o; 33 non-fallers 66.0±11.6 y/o)	Construct validity: $r = 0.94$	NA	NA	To predict future falls: Cutoff score of <52/56	64% (95% CI: 47-78%)	67% (95% CI: 50-80%)	NA	NA
	Jacome et al., 2016	Participants with COPD (75.9±7.1 y/o; n=46)	With ABC scale: $\rho = 0.75$	Inter-rater reliability: ICC= 0.94 (95% CI .88-.97) Intra-rater reliability: ICC= 0.52 (95% CI .19-.74)	MDC= 5.9 (SEM= 2.1)	With and without history of falls: Cutoff score of 52.5/56	73%	77%	3.20	0.35

	Lee et al., 2016	Hemiparetic stroke patients from rehab center (58.19 ± 9.03 y/o; n=75)	NA	NA	NA	To predict level of community ambulation (defined as gait speed > 0.8 meters/sec): > 46.5/56	79%	76%	72%	82%
	Marques et al., 2016	Community-dwelling older adults (76±9 y/o; n=122)	With ABC scale: rho= 0.58	Inter-rater reliability: ICC= 0.88 (95% CI 0.77-0.94) Test-retest reliability: ICC= 0.50 (95% CI 0.15-0.73)	MDC= 4.6 (SEM= 1.4)	To identify participant with or without history of falls: Cutoff score of 48.5/56	74%	72%	2.59	0.37
	Park et al., 2017	Systematic review; individuals from 21 studies (age > 60 y/o; n=9,743)	NA	NA	NA	NA	73% (95% CI: 65-79%)	90% (95% CI: 86-93%)	NA	NA
	Jorgensen et al., 2017	Ambulatory adults with chronic spinal cord injury (55±17 y/o; n=46)	With mini-BESTest: r= .889 With TUG test: r= -.75 With SCIM: r= 0.88 With 10 m walk time: r= -.88 With WISCI II: r= 0.63 With FES-1: r= -0.62	NA	NA	Between walkers without walking aids and those with walking aids: Cutoff score of >47/56 Between participant with low/high concerns of falling: ≤46/56	NA	NA	NA	NA

	Lusardi et al., 2017	Systematic Review/Meta analysis	NA	NA	NA	≤50	41%	88%	NA	NA
	Lima et al., 2018	Systematic review. 8 studies included (n=2161)	NA	NA	NA	cut-off scores for BBS, ranging from 45 to 51 out of total scores of 56	NA	NA	NA	NA
	Laratta et al., 2019	Individuals with Adult Spinal Deformity (59.8±13.3 y/o; n=21)	BBS not associated with measures of clinical and radiographic improvement in ASD patients. The test was also potentially problematic in that it has a ceiling effect	NA	NA	NA	NA	NA	NA	NA

**Note:** Since this outcome measure was developed, there have been several articles that reported data on areas of reliability, validity, etc. The older publications are not listed in this summary table, as this Toolkit focuses on recent articles. For further research, the Taskforce members suggest reading the earlier articles.

**Note:** This outcome measure is also validated in languages addition to English.

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Brunel Balance Assessment</b>	Tyson et al., 2004	Community subjects with previous stroke (67.4 ±12.8 y/o; n=92) Reliability testing (66±12.8 y/o; n = 37) Validity testing (68±12.8 y/o; n = 55)	Correlation coefficients 0.83 for Motor Assessment Scale, 0.97 with Berg Balance Test and 0.95 with Rivermead Mobility Index	100% agreement (K=1) for both test retest reliability and inter-tester reliability.	1 point	NA	NA	NA	NA	NA
	Tyson, et al., 2007	Participants after stroke (70±7 y/o; n=75)	Findings of this study confirm the predictive validity of the BBA	NA	NA	NA	NA	NA	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Canadian Occupational Performance Measure (COPM)</b>	McColl et al., 2000	Disabled adults (age range 18-75 y/o; n=61)	Construct validity with Satisfaction with Performance Scaled Questionnaire (SPSQ), Reintegration to Normal Living Index (RNL), Life Satisfaction Scale (LSS) at $p < .0005$ , correlations .37 - .46 Criterion validity with Perceived Problem Check List (PPCL): Frequency of reported problems: PPCL COPM Selfcare 60% 46% Productivity 22% 23% Leisure 9% 31%	NA	NA	NA	NA	NA	NA	NA
	Sewell et al., 2001	COPD, pulmonary rehabilitation outpatient (age range 53-79 y/o; n=15)	NA	Mean differences: Performance = .14, Satisfaction = .42, CI 95% Intraclass correlation coefficients: Performance $r = 0.92$ ; Satisfaction $r = 0.90$ , $p < .0001$	NA	NA	NA	NA	NA	NA
	Cup et al., 2003	Stroke, s/p 2 month, (mean age 68 y/o, 26-83 y/o; n = 26)	Discriminant validity with: BI, FAI, SA-SIP30, EQ-5D, Rankin Scale $r = -0.225$ , $-0.115$ , $0.102$ , $0.143$ , $0.209$ respectively	Test-retest reliability $\rho =$ Performance .89 & Satisfaction .88 at $p < 0.001$	NA	NA	NA	NA	NA	NA
	Dedding et al., 2004	Neurological and orthopedic outpatient adults (n = 99; age information not available)	Divergent validity with SIP68 Performance $r = -0.20$ , $p = 0.05$ ; Satisfaction $r = -0.19$ , $p = 0.07$ ; Convergent validity with Disability & Impact Profile (DIP) 63% corresponding items	NA	NA	NA	NA	NA	NA	NA

	Eyssen et al., 2011	Adults with various diagnoses in outpatient clinics (51±13 y/o; n=138)	Construct validity with SIP68, DIP & Impact on Participation and Autonomy (IPA) p = <0.01	NA	NA	NA	AUC 79-85%	NA	NA	NA
	Larsen et al., 2012	Older adults referred to community-based geriatric rehabilitation (age range 67-95 y/o; n=124) in Demark	Statistically significant positive change (p < 0.001) in both performance and satisfaction with performance	NA	NA	NA	NA	NA	NA	NA
	Tuntland et al., 2016	Older adults at home-base who were in need of rehabilitation for various health conditions, (mean age 80.8 y/o; n=225)	NA	NA	COP M-P 3.0 points COP M-S, 3.2 points	NA	NA	NA	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Clinical Test of Sensory Interaction on Balance (CTSIB; also called SOT in '90s but with same protocol on level ground)</b>	Di Fabio et al., 1990	Stroke patients in university hospital (age range 29-70 y/o; n = 10)	Construct validity with Fugl-Meyer Sensorimotor Assessment (FMSA) Sensory rho = .55, $P < .05$ Balance rho = .77, $p < .01$ Total LE rho = .69, $p < .05$	Interrater reliability Kappa .95, $P < .05$	NA	NA	NA	NA	NA	NA
	Anacker et al., 1992	Community-dwelling older adults; fallers & non-fallers (age range 65-96 y/o; n = 47)	Construct validity with Get Up and Go Test (GUGT) Spearman Rho = -.67 fallers; -.44 non-fallers	Test retest reliability $r = .75$ , $p < .05$	NA	NA	NA	NA	NA	NA
	Cohen et al., 1993	Healthy adults (25-85 y/o; n=15) and adults with vestibular dysfunction (30-87 y/o; n=17)	Predictive validity of scores between the 2 groups. Condition 5 $t = 4.17$ , $P < .001$ Condition 6: $t = 5.58$ , $P < .001$	Test-retest reliability & interrater reliability $r = .99$ , $p < .01$	NA	NA	NA	NA	NA	NA
	Di Fabio et al., 1996	Community-dwelling older adults; 16 fallers, 31 No-fallers (age range 65 - 96 y/o).	Construct validity: Discriminant functions classified: Non-fallers: 77% Fallers: 63%	NA	NA	Total composite scores < 259 seconds  Foam-base stance duration < 81 seconds	Identifying fallers 44%  75%	90%  65%	NA  NA	NA  NA



	El-Kashlan et al., 1998	Two Groups: Healthy adults (age range 20-79 y/o; n =69) and adults with vestibular dysfunction (age range 20-70 y/o; n = 35)	Construct validity with Dynamic Posturography (SOT) on Balance Master Baseline: $r = 0.41$ , $P \leq 0.018$ 1 month: $r = .74$ , $P \leq 0.000$ 2 months: $r = 0.89$ , $P \leq 0.000$ 3 months: $r = .41$ , $P \leq 0.034$	NA	NA	NA	Sensitivity of 60% in identifying vestibular dysfunction	NA	Normal CTSIB: 89% Abnormal CTSIB: 55%	NA
	Bernhardt et al., 1998	Stroke patients in acute inpatients (71.8±10.5 y/o; n=29)	Correlations ( Pearson's $r$ ) with Locomotion Measures (Step Test, gait velocity, Motor Assessment Scale ) >.40, $p < 0.0036$	NA	NA	NA	NA	NA	NA	NA
	Ricci et al., 2009 (added additional data by Lusardi et al., 2017)	Community-dwelling older adults (75.2±11.7 y/o; n=96)	NA	NA	NA	EO-Firm<30s EC-Firm<30s Dome-Foam<30s EO-Foam<30s EC-Foam<30s Dome-Foam<30s	3% 16% 22% 19% 50% 41%	100% 94% 94% 100% 81% 81%	NA	NA
	Freeman et al., 2018	Parkinson's Disease, Idiopathic Parkinson's Disease (62.7±13.5 y/o; n=26)	Concurrent validity with Instrumented mCTSIB & SOT Composite Score = $r = -.43$ , $p = 0.03$ to $0.64$ , $p < .001$ Condition 1= $r = 0.43$ , $p = 0.03$ Condition 2= $r = 0.16$ , $p = 0.43$ Condition 3 $r = -.60$ , $p < .001$ Condition 4 $r = 0.54$ , $p < .001$	NA	NA	NA	NA	NA	NA	NA

	Cohen et al., 2019	Community-dwelling outpatient older adults with vestibular disorders (59.7±14.4 y/o; n=90); healthy controls (55.1±18.9 y/o; n=292)	NA	NA	NA	7.5 points (modified short version) Individual Test: ROC values 0.67-0.84 yaw & pitch head movements	62%	62%	NA	NA
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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Community Balance &amp; Mobility Scale (CB&amp;M)</b>	Howe et al., 2006	Traumatic brain injury patients undergoing inpatient and outpatient neurorehabilitation Phase 1 (31±9 y/o; n=36) Phase 2 (34±12 y/o; n=36)	Content validity with Therapist Global Rating Scale $r = 0.62$ , $P < 0.001$ Construct validity with self-paced gait & max gait velocity; $r = 0.53$ and $r = 0.64$ at $P < 0.001$ respectively	Inter, inter, test-retest reliability & internal consistency ICCs of 0.977, 0.977, 0.975 & Cronbach's alpha 0.96 respectively	9.6 (SEM & Cronbach's $\alpha$ )	NA	NA	NA	NA	NA
	Knorr et al., 2010	Stroke patients who are community-dwelling and ambulatory (62.6±12 y/o; n=44)	Convergent validity with BBS, TUG, Chedoke McMaster Stroke Assessment (CMSA) TUG & BBS $P < .01$ , $p = .70$ -.83 CMSA, $p = .67$ at $P < .001$	NA	Sensitivity to change, 0.83 (ratio of mean change in scores divided by SD of change scores), $P = < .001$	NA	NA	NA	NA	NA
	Inness et al., 2011	Traumatic brain injury inpatient and outpatient private clinic undergoing neurorehabilitation, ambulatory (18-60 y/o; n=35)	Construct validity with Spatiotemporal Gait measures, ABC and Community integration Questionnaire (CIQ) CIQ $r = 0.54$ , $p < 0.001$ ABC $r = 0.60$ , $p = 0.011$ Spatiotemporal Gait Measures $p < 0.05$ ; moderate to excellent correlation with velocity, step length, step width, step time; correlation with dynamic instability, step time & step with variability, $p < 0.001$	NA	NA	NA	NA	NA	NA	NA

	Takacs et al., 2014	Patients with knee osteoarthritis (62.5±7.4 y/o; n=25) Control subjects (63.3±6.2 y/o; n=25)	In the knee OA group, scores on all balance and mobility tests were significantly correlated with CB&M scores, with correlations ranging from .52 to .74, indicating moderate convergent validity. The CB&M correlated with the TUG, and with the BBS. Participants with knee OA scored, on average, 71 points (SD13) on the CB&M, and those in the control group scored 85 points (SD10) indicating known-groups validity due to a 14 points difference ( $p < 0.001$ ).	Test retest reliability of the CB&M was high: ICC.95 (95% CI.70 to .99), SEM3 (95% CI2.68 to 4.67).	95% value-10	NA	NA	NA	NA	NA
	Balasubramanian et al., 2015	Older adults (73.4±6.9 y/o; n=40)	Correlations between CB&M and DGI, BBS, and SPPB ( $\rho = 0.75-0.87$ ; $P < .01$ ) Correlations between CB&M and 6MWT, TUGT, and self-selected gait speed ( $\rho = 0.65-0.71$ ; $P < .01$ ). Significant correlation between CB&M and falls in the past year, ABC, FRT, swing time, and stance time variability ( $\rho = 0.34-0.47$ ; $P < .01$ ).	Interrater reliability at ICC=0.953 (95% CI = 0.88-0.98) Intrarater reliability at ICC=0.962 (95% CI = 0.928-0.98). high Cronbach's alpha at 0.962.	NA	Predicted falls history: CB&M ≤ 45  CB&M ≤ 39	79%,  93%	76%,  60%	65 %  57%	86%.  94%

	Lee et al., 2016	Patients with hemispheric stroke, 5 months post onset ( $44.4 \pm 15.9$ y/o; n=16)	Positive correlation between Korean CB&M and BBS, negative correlation between Korean CB&M and TUG	Interrater reliability-0.517-0.947, intra-rater reliability-0.64-0.978	NA	NA	NA	NA	NA	NA
	Weber et al., 2017	Young older adults ( $66.4 \pm 2.7$ y/o; n=51)	The CB&M correlated high with the FAB ( $\rho = 0.74$ ; $p < .001$ ); good with the 3MTW ( $\rho = 0.61$ ; $p < .001$ ); and moderate with TUG, gait speed, and 8-level balance scale ( $\rho = 0.31-0.52$ , $p < .05$ ).	Reliability (ICC > .95), internal consistency ( $\alpha = .74$ ) were good.	Responsive-ness (SRM=0.75, $p < .001$ )	NA	NA	NA	NA	NA
	Weber et al., 2018	Adults participants (60-70 y/o; n=51)	correlated with multiple other outcome measures including TUG; Internal consistency alpha = 0.88	Interrater ICC2, k = 0.97; Intra-rater ICC3, k = 1.00	NA	NA	NA	NA	NA	NA
	Martelli et al., 2018	Cardiac rehabilitation program participants ( $67.2 \pm 8.8$ y/o; n=53)	CB&M score correlated with length of stay results (0.41-0.53)	Interrater reliability between novice and expert testers- $r=0.95$	NA	NA	NA	NA	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
CONFbal	Simpson et al., 2009	Study 1: older adults (81±7 y/o; n = 45) Study 2: Geriatric hospital patients (81±6 y/o; n = 153)	Internal consistency: Cronbachs alpha 0.91	ICC 0.95	3 points	NA	NA	NA	NA	NA
	Regan et al., 2018	Outpatient post-stroke patients (43-57 y/o; n=80)	Pearson correlation coefficient (r) with ABC scales: -0.70	Cronbach's alpha 0.84	NA	NA	NA	NA	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
Conley Scale	Conley et al., 1999	Patients of hospital medical surgical unit (74±11.3 y/o; n=1168) in Japan	NA	Interrater reliability- >=0.80	NA	≥2	71%	59%	NA	NA
	Lovallo et al., 2010	Patients in acute medical, surgical wards and rehabilitation units (70±10.3 y/o; n=1148) in Italy	NA	NA	NA	≥2 Medical unit  Surgical unit	77%  47%	49%  73%	9%  3%	97%  98%
	Palese et al., 2016	Patients in acute medical unit (74.4±1.7 y/o; n=1464) in Italy	Internal consistency: Cronbachs alpha 0.465	ICC 0.95	3 points	≥2	60%	55.9%	3%	98.5%

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Demura's Fall Risk Assessment Chart (DFRA)</b>	Demura et al., 2010	Healthy community-dwelling adults (349 males 70.4±7.1 y/o; 616 females 69.9±7.1 y/o; total n=965) in Japan	With Tokyo Metropolitan Institute of Gerontology (TMIG)	NA	NA	≥ 1 point of each of 5 risk factor scores;	14.4% (total score); 39.7% (independent risk factor scores)	NA	Odds ratios calculated for each risk factor score & total score; ≥ 3 points = odds ratio of ≥ 5	NA
	Demura et al., 2011	Healthy community-dwelling adults (70.3±7.1 y/o; n=1122) in Japan	NA	Total score = Test – retest ICC .956, N = 172	NA	Total Score >2 points	NA	NA	Total Score OR 5	NA
	Demura et al., 2012	Healthy community-dwelling adults (70.3±7.1 y/o; n=1122) in Japan	With TMIG	NA	NA	Overall score 22 points  PF-3 score 1 point  Pf-4 score 2 points	30.6%; (AUC .68%)  86.9%; (AUC .79.7%)  86.9%; (AUC 94.6%)	72%  65.7%  90.6%	NA	NA
	Demura et al., 2013	Healthy community-dwelling adults (70.1±7.1 y/o; n=965) in Japan	NA	NA	NA	Potential for falling 1 point Physical function 10 points Diseases & Physical 5 points Behavior & character 3 points Environment 1 point	87%; AUC 80% 40%; AUC 63% 30%; AUC 63% (CI 95%) 53%; AUC 67% (CI 95%) 78%; AUC 54% (CI 95%)	66% 81% 87% 75% 27%	NA	NA
	Park et al., 2018	Meta-analysis; Community-dwelling older adults (70.3±7.1 y/o; n=1122)	NA	NA	NA	≥2	31%	7%	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Downton Fall Risk Index</b>	Nyberg et al., 1996	Geriatric stroke rehabilitation unit patients (74.8±8.9 y/o; n=135)	NA	NA	NA	≥ 3 high fall risk	91%	27%	44.4%; Odds ratio 3.5	81.5%
	Rosendahl et al., 2003	Participants from residential care facility; 47% dementia 45% depression 32% stroke (81± 6 y/o; n=78)	NA	NA	NA	≥ 3 high fall risk	91%	39%	36% fall risk high risk group; 5% low risk group	NA
	Vassallo et al., 2008	Geriatric general rehabilitation ward (mean age 80.9 y/o; n=200)	Predictive validity with STRATIFY no significant difference	NA	NA	≥ 3 high fall risk	92.2%	35.8%	33.1%	92.9%
	Moller et al., 2012	Frail older adults (81.5±6.3 y/o; n=153)	Predictive validity- ≥ 3 cut off score predicts falls in frail older people living at home with a sensitivity of 80%	NA	NA	≥ 3 fall risk	79%	24%	NA	NA
	Nilsson et al., 2016	Older adults (82.4±7.8 y/o; n= 128,596) in Sweden	Predictive validity- High fall risk (DFRI ≥3) independently predicted fall-related injury (hazard ratio (HR) = 1.43, 95% confidence interval (CI) = 1.39–1.49), hip fracture (HR = 1.51, 95% CI = 1.38–1.66), head injury (HR = 1.12, 95% CI = 1.03–	NA	NA	≥ 3 high fall risk	NA	NA	NA	NA

			1.22), and all-cause mortality (HR = 1.39, 95% CI = 1.35–1.43). DFRI more strongly predicted head injury (HR = 1.29, 95% CI = 1.21–1.36 vs HR = 1.08, 95% CI = 1.04–1.11) and hip fracture (HR = 1.41, 95% CI = 1.30–1.53 vs HR = 1.08, 95% CI = 1.05–1.11) in 70-year old men than in 90-year old women (P < .001)							
	Bueno-Garcia et al., 2017	Public hospital; patients with all diagnoses (mean age 67 y/o, age details not available; n=469)	Poor external validity in this population	NA	NA	NA	58%	62%	1%; odds ratio 2.31	99%
	Mojtaba et al., 2018	Hospitalized patients (84±7 y/o; n=6650)	Among individual modules, only previous falls (IRR 2.58, 95% CI 2.22 to 3.01) and unsafe gait (IRR 1.79, 95% CI 1.53 to 2.09) were associated with fall-related injuries.	NA	NA	The cutoff 3 points significantly associated with fall-related injury (IRR 1.94, 95% CI 1.60 to 2.38).	NA	NA	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Dynamic Gait Index (DGI)</b>	Shumway-Cook et al., 1997	Community-dwelling adults (age range 65-96 y/o; n=44)	Balance Self-Perceptions Test, Berg Balance Test r = .76	Interrater r = .96; Test-retest r = .98; N = 44	NA	≤ 19 points	59%	64%	NA	NA
	Whitney et al., 2000	Adults with vestibular disorder (62.4±17.2 y/o; n=247)	NA	NA	NA	≤ 19 points with Odd ratio 2.58	NA	NA	NA	NA
	Whitney et al., 2003	Outpatient patients with vestibular and balance dysfunction (64.9±17.0 y/o; n=70)	With Berg Balance Scale; r = .71; p < .01	NA	NA	NA	NA	NA	NA	NA
	Wrisley et al., 2003	Outpatient patients with vestibular disorders (61±17 y/o; n=30)	NA	Interrater k = .68; Spearman Rho r = .95, P < .0001; N = 30	NA	NA	NA	NA	NA	NA
	Whitney et al., 2004	Outpatient patients with vestibular disorders (60±17 y/o; n=103)	NA	NA	NA	≤ 18 points for previous 6 month fall	70%	51%	NA	NA
	Hall et al., 2004	Outpatient patients with unilateral vestibular hypofunction (age range 28-86 y/o; n=47)	NA	NA	NA	NA	77%	90%	NA	NA
	Legters et al., 2005	Outpatient, peripheral vestibular disorder; (age range 24-87 y/o; n=137)	With Activities-specific Balance Confidence Scale; Total Sample: r = .58 (p < .0001); Mild-Mod vestibular weakness: r = .72 (p < .0001); Severe-Total vestibular weakness: r = .48 (p < .0001)	NA	NA	NA	NA	NA	NA	NA

	McConvey et al., 2005	Individuals with Multiple Sclerosis (age information not available; n=10)	With 6.1 m Timed Walk; $r = -.801$ , $P < .01$	Interrater .983 ( $P < .05$ ); Intra-rater reliability .910-.976 ( $p = .05$ ); $N = 10$	NA	NA	NA	NA	NA	NA
	Dibble et al., 2006	Individuals with Idiopathic Parkinson's Disease; ( $69.9 \pm 11.3$ y/o; n=45)	NA	NA	NA	Previous research: $\leq 19$ points Current research: 22 points	75% 89%	30% 48%	NA	NA
	Hall et al., 2006	Adults with peripheral vestibular disorders ( $51.8 \pm 13.4$ y/o; n=16)	NA	Test-retest ICC 3,1 = .86	NA	NA	NA	NA	NA	NA
	Marchetti et al., 2006	Individuals with and without vestibular and balance dysfunction ( $56.7 \pm 20.3$ y/o; n=123)	4-Item Test Cronbach's alpha .89 8-Item Test Cronbach's alpha .92	Interrater Kappa .54 - .80	NA	4-Item test $< 12$ points 8-Item Test $< 19$ points	85% 86%	75% 86%	NA	NA
	Cattaneo et al., 2006	Individuals with Multiple Sclerosis; (mean age 45 y/o; age details not available; n=51)	With Berg Balance Scale $r = 0.78$ TUG $r = 0.72$ Hauser Deambulation Index $r = 0.8$ Dizziness Handicap Inventory $r = -0.39$ ; ABC $r = 0.54$	NA	NA	NA	NA	NA	NA	NA
	Jonsdottir et al., 2007	Individuals with stroke, rehabilitation outpatient ( $61.6 \pm 13.1$ y/o; n=25)	With Berg Balance Scale $r = .83$ ABC $r = .68$ Timed Walking Test $r = -.73$ TUG $r = -.77$	Test-retest ICC .96 Interrater reliability ICC .96 $N = 25$	NA	NA	NA	NA	NA	NA
	Cakit et al., 2007	Individuals with Idiopathic Parkinson's Disease ( $71.8 \pm 6.4$ y/o; n=44)	With UPDRS motor subscale $r = -.643$ , $p < .01$ Fall history $R = .643$ , $p < .01$	NA	NA	NA	NA	NA	NA	NA

	Landers et al., 2008	Individuals with Idiopathic Parkinson's Disease (70.9±8.9 y/o; n=49)	Discriminant: fallers 16.1 SD = 3.4 Non-fallers 19.6 SD = 2.6, $p < .01$	NA	NA	NA	NA	NA	NA	NA
	Hwang et al., 2010	Individuals with Parkinson's Disease (80.4±7.1 y/o; n=22)	With Berg Balance Test- good( $r=0.852$ )	Intra-rater reliability- 0.96, inter-rater reliability- 0.98	NA	NA	NA	NA	NA	NA
	Lin et al., 2010	Individuals with stroke in outpatient rehabilitation (60.0±12.6 y/o; n=45)	With DGI-4 & Functional Gait Assessment $r > .91$	Test-Retest ICC .94 (CI 95%)	4.0	NA	NA	NA	NA	NA
	Jonsson et al., 2011	24 subjects from hospital (79.4±6.8 y/o) and 24 from outpatient rehabilitation center (76.8±6.4 y/o) with fall history	NA	Hospital: Intra-rater ICC .90 Interrater ICC .92; N=24 Rehab Center: Intra-rater ICC .89 Interrater ICC .82; N = 24	NA	NA	NA	NA	NA	NA
	Huang et al., 2011	Outpatient individuals with movement disorders (67.5±11.6 y/o; n=72)	NA	Test-Retest ICC .84 (CI 95%)	2.9 (13.3)	NA	NA	NA	NA	NA
	Romero et al., 2011	Community-dwelling adults with fall or near fall history (age range 59-88 y/o; n=42)	NA	NA	2.9 (95%)	NA	NA	NA	NA	NA
	Weiss et al., 2013 (added additional data by Lusardi et al., 2017)	Community-living older adults (78.36±4.7 y/o; n=71)	NA	NA	NA	Retrospective  Prospective	64%  38%	98%  90%	NA	NA
	Lusardi et al., 2017	Systematic review included 95 articles	NA	NA	NA	≤19 points	68%	34%	NA	NA
	Mañago et al., 2019	Adults with Multiple Sclerosis (47.7±11.3 y/o; n=72)	Significantly correlate with many strengths measures	NA	NA	19 points AUC=0.8; +LR=2.92; - LR=0.32	76%	74%	NA	NA



**Note:** Since this outcome measure was developed, there have been several articles that reported data on areas of reliability, validity, etc. The older publications are not listed in this summary table, as this Toolkit focuses on recent articles. For further research, the Taskforce members suggest reading the earlier articles.

**Note:** This outcome measure is also validated in languages addition to English.

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Elderly Fall Screening Test</b>	Cwikel et al., 1998	Community-dwelling adults (mean age 71.5 y/o; age details not available; n=361)	Concurrent with physician examination Predictive with f/u interview	NA	NA	2+	83% physician	69% physician	66.7% (physician); RR > 3.0 for fall related parameters	NA

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Cwikel JG, Fried AV, Biderman A, et al. Validation of a fall-risk screening test, the Elderly Fall Screening Test (EFST), for community-dwelling elderly. *Disabil and Rehabil.* 1998;20(5):161-7.

Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
Elderly Mobility Scale	Smith et al., 1994	Frail older adults (age range 70-93 y/o; n=36)	With Barthel Index (BI) (Spearman's Rho .962); Functional Independence Measure (FIM) (Spearman's Rho .948)	Inter-rater reliability was established on 15 patients who were assessed independently by two physiotherapists. There was no significant difference between scores.	NA	NA	NA	NA	NA	NA
	Prosser et al., 1997	Hospitalized older adults; validity study (age range 66-69 y/o; n=66); reliability study (age range 71-95 y/o; n=19)	With Barthel Index ( $r = .79$ , $p < .0001$ )	Interrater .88, $p < .0001$	NA	NA	NA	NA	NA	NA
	Spilg et al., 2003	Community-dwelling and residential care older adults with mobility problems (61-92 y/o; n=76)	EMS, Functional Reach and Barthel Index at discharge, significantly associated with the risk of having two or more falls ( $p = 0.008$ , $0.017$ and $0.031$ )	NA	NA	Low risk $\geq 20$ for recurrent falls s/p DC from geriatric Day Program	NA	NA	NA	NA
	Yu et al., 2007	Older adults from 6 residential homes in Hong Kong ( $79.0 \pm 8.7$ y/o; n=156).	NA	NA	NA	Functional Mobility 13/14	93.3%	93.3%	NA	NA
	Park et al., 2016	Stroke patients from acute hospital ( $\geq 65$ y/o, age details	High concurrent validity with the mRMI( $r = .78$ ), MAS ( $r = .82$ ), TUG( $r$	Inter -rater agreement was high for separate item (weight kappa=0.62	3.8	NA	NA	NA	NA	NA

		not available; n=33)	=-.72), MBI(r=.75), BBS(r=.81)..	~ 077) except for gait and functional reach (weight kappa=0.53 and 0.44 respectively). Item-to-total correlations were all significant, ranging from $r = .77 \sim .93$ ( $p < .01$ ); EMS possessed high internal consistency (Cronbach's $\alpha = .86$ ) and individual items also possessed high internal consistency ( $\alpha = .79 \sim .88$ ); the inter-rater reliability of EMS summary score was excellent (ICC=0.90 [0.77 ~ 0.96])						
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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Euroqol (EQ-5D)</b>	Brazier et al., 1993	General practice patients; (age range 16-70 y/o; n=1980)	Concurrent validity with SF-36 Construct validity: no statistics presented	Spearman Rank correlation coefficient range 0.48-0.60 ( $p<0.01$ )	NA	Poor sensitivity at high score due to ceiling effects	NA	NA	NA	NA
	Van Agt et al., 1994	Dutch general population (49.3±18.7 y/o; n=208)	NA	Test-retest analysis	NA	NA	NA	NA	NA	NA
	Schweikert et al., 2006	Patients with acute coronary syndromes in Germany (55±7.6 y/o; n=106)	Significant correlations with domains of the SF-36 ( $r = 0.21$ to $r = 0.74$ )	Ceiling effects found after Rehabilitation	NA	NA	NA	NA	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Fall Handicap Inventory</b>	Rai et al., 1995	Hospital patients with fall history (78 ± 5.6 y/o; n=28)	validated with fall efficacy scale ( $r = -7.5$ , $p< 0.0001$ )	NA	NA	NA	NA	NA	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
Fall Perception Questionnaire (F RAQ)	Bos et al., 2017	Community-dwelling older adults as focus groups ( $\geq 60$ y/o, details of age not available; n=10)	Content validity coefficient (VC): .71-.80 for the 3 categories	NA	NA	NA	NA	NA	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
Fall Prevention Strategy Survey	Finlayson et al., 2009	Adults with Multiple Sclerosis ( $53.5 \pm 9.5$ y/o; n=457)	Rasch Validation: Analysis indicated that the rating scale structure (i.e., response options) was valid. Of the original 19 items, 8 of them misfit and needed to be dropped to obtain a valid instrument under the Rasch model. With the final 11 items, the instrument was able to distinguish participants of different ability levels across a range of 11.58 logits. Content validity was confirmed by item fit of Rasch Analysis.	NA	NA	NA	NA	NA	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Fall Risk for Older People in the Community (FROP-COM)</b>	Russell et al., 2008	Older adults at home 27 days post discharged from ED; intra-rater reliability (73.7±6.5; n=20) Inter-reliability (77.3±8.6; n=20) validity and predictability (75.9±8.5 y/o; n=344) in Australia	Correlation with; Functional Reach: $r = .50$ ; with TUG: $r = .62$ 95% CI	ICC for intra-rater reliability was 0.93 (95% CI: 0.84–0.97), and for inter-rater reliability was 0.81 (95% CI: 0.59–0.92)	NA	18/19	71.3%	56.1%	NA	NA
	Russell et al., 2009	Community dwelling older adults presented to ED after a fall (75.9±8.5 y/o; n=344) in Australia	NA	Intrarater ICC 0.87 (95%CI 0.70-0.98); Interrater ICC 0.89 (95% CI 0.75-0.96)	NA	3/4	67.1% (95%CI 59.9-74.3%)	66.7% (95%CI 59.8-73.6%)	64.7% (95% CI 57.0-71.9)	69.0% (95% CI 61.5-75.7)
	Liou et al., 2014	Community dwelling older adults in Taiwan (mean age-76.8 y/o; n=402)	Content validity mean- 0.97 (0.92-1.00)	Intrarater- 97.1%; Interrater- 82.9%	NA	NA	NA	NA	NA	NA
	Mascarenhas et al., 2019	Older adults presenting to emergency after a fall (72.4±8.3 y/o; n=213)	NA	NA	NA	NA	Predicting falls-43.4%, injurious falls- 34.4%	Predicting falls 79.4%, injurious falls- 78.6%	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Falls Behavior Scale</b>	Clemson et al., 2003	Community-dwelling older adults. nursing home and hospital-based residents (age range 65-98 y/o; n=418)	Content validity index 28/30 items, CVI=93; Construct validity: scores positively associated with increasing age ( $r_s = .46$ , $p < .01$ ); negatively associated with physical mobility ( $r_s = .68$ , $p < .01$ )	Test-retest reliability ICC =.94 ( $p < .01$ )	NA	NA	NA	NA	NA	NA

**References:**

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
Falls Efficacy Scale – Int	Yardley et al., 2005	Community-dwelling older adults (age range 60-95 y/o; n=705)	NA	Excellent internal and test-retest reliability Cronbach's alpha .96 (ICC .86)	NA	NA	NA	NA	NA	NA
	Delbaere et al., 2010 (added additional data by Lusardi et al., 2017)	Community-dwelling older adults (mean age 77.4; 70-90 y/o; n=500)	Content Validity: .93 Positive associated with increase in age ( $r_s=46$ , $p<.01$ ) Neg association with greater physical mobility ( $r_s=-.68$ , $p<.01$ ) and leaving the home more often in the past week ( $r_s=-.51$ , $p<.01$ )	ICC=.79	NA	Fall concern: 16-19 low 20-27 moderate 28-64 high  >21	NA  62%	NA  54%	NA	NA
	Hauer et al., 2010	Patients from geriatric rehab ward ( $81.8\pm6.1$ y/o; n=156)	NA	Test-retest ICC .96	NA	NA	NA	NA	NA	NA
	Hauer et al., 2011	Patients with ( $82.5\pm6.2$ y/o; n=157) or without cognitive impairment ( $81.6\pm6.8$ y/o; n=127) from geriatric rehab ward	NA	Test-retest ICC .58 to .92 Excellent internal consistency (Cronbach's alpha=.92)	NA	NA	NA	NA	NA	NA
	Kwan et al., 2012 (added additional data by Lusardi et al., 2017)	Taiwanese community-dwelling people not taking anti-depressant medication (65–91 y/o; n=260)	NA	NA	NA	$\geq 24$	74%	73%	NA	NA

	Morgan et al., 2013	Adults from community with balance and vestibular dysfunction from a neurological clinic (54±15 y/o; n=53)	Criterion validity: correlations with Activities Balance Confidence Scale (ABC) scores: $r=-.84$ With Dizziness Handicap Inventory (DHI) $r=.75$ Vestibular Activities and Participation (VAP) ( $r=.78$ ) Correlations with gait speed ( $r=-.55$ ) With Dynamic Gait Index (DGI) ( $r=-.55$ )	Test-retest ICC .94	8.2	NA	NA	NA	NA	NA
	Dewan et al., 2014	Appraisal article reviewed data from several articles with community-dwelling older adults	NA	Test-retest ICC .96	NA	NA	NA	NA	NA	NA
	Visschedijk et al., 2015	Older adults s/p hip fracture (mean age 83.1 y/o; n=100)	Internal consistency 3rd or 4th week after SNF admission = (Cronbach's alpha = .94)	Inter-rater reliability ICC.72	17.7	NA	NA	NA	NA	NA
	Lusardi et al., 2017	Systematic review included 95 studies ( $\geq 65$ y/o)	NA	NA	NA	$\geq 24$	66%	60%	NA	NA
	Park et al., 2018	Community-dwelling hemiplegic stroke patients in Korea Fallers (64.8±9.8 y/o; n=35) Non-fallers (62.8±8.6 y/o; n=64)	NA	NA	NA	23 AUC=0.68	70%	64%	NA	NA

<b>FES-I short</b>	Kempen et al., 2008	Community-dwelling older adults (76.6 ±5.3 y/o; n=300) in Dutch country	Correlation with FES-I = .97	Internal and test-retest reliability excellent with Cronbach's alpha .92 (ICC .83)	NA	NA	NA	NA	NA	NA
<b>EFS-Modified</b>	Payne et al., 2003 (added additional data by Lusardi et al., 2017)	Older adults from rural (75.5±7.7 y/o; n=40) and urban (76.0±7.3 y/o; n=75) community	NA	NA	NA	<6	21%	94%	NA	NA

**Note:** Since this outcome measure was developed, there have been several articles that reported data on areas of reliability, validity, etc. The older publications are not listed in this summary table, as this Toolkit focuses on recent articles. For further research, the Taskforce members suggest reading the earlier articles.

**Note:** This outcome measure is also validated in languages addition to English.

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Fear Avoidance Beliefs Questionnaire</b>	Chugh et al., 2013	Patients with Low Back Pain (mean age 46 y/o, range 19-76 y/o; n=55)	Construct Validity FABQ-P -with FABQ-W significant correlation (r=0.496 p=0.00) -with VAS significant correlation (r=0.0320 p=0.017) -with FABQ total significant correlation (r=0.794 p=0.00) -with RMDQ Roland Morris Disability Questionnaire significant correlation (r=0.372 p=0.005) -with Osteresky Disability Questionnaire no significant correlation (r=0.199 p=0.146)	NA	NA	NA	NA	NA	NA	NA
	Dedering et al., 2013	Patients with cervical radiculopathy (49± 9.8 y/o; n=46); and healthy participants (44±6.6 y/o; n=41)	FABQ has concurrent validity for patients with cervical radiculopathy  Good correlation (spearman correlation coefficient >0.50) between FABQ-PA with TSK (0.62)  Poor correlation between TSK with FABQ-W (0.32) and FABQ-SUM (0.47)	Test retest reliability: Good to moderate for FABQ Weighted kappa values (k-value is good if >0.60) FABQ-PA -0.50 FABQ-W-0.67 (good) FABQ SUM-0.68  ICC of FAQB SUM -0.93  Internal consistency Cronbach's Alpha = 0.89	NA	NA	NA	NA	NA	NA

	Landers et al., 2016	Participants with or without pathology (72.2±7.2 y/o; n=64)	<p>ROC Curves &amp; area under curve: Fallers at 1yr after assessment, 95%CI 0.62-0.91; frequent fallers at 1 year after assessment, 95%CI 0.70-0.95</p> <p>Predictor variables used: Physical -BBS, TUGT, SSGS, DGI, SOT : Psychological -ABC, FABQ, FES</p> <p>ABC and FABQ were the best at predicting future falls both independently and when compared against other predictor variables.</p>	NA	NA	NA	NA	NA	NA	NA
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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Figure 8 Walk Test</b>	Hess et al., 2010	Community-dwelling older adults (76.8±5.5 y/o; n=51)	NA	Interrater reliability ICC (95% CI) For time: 0.90 For number of steps: 0.92 For smoothness: 0.85 Test retest reliability ICC values (95%CI) For time: 0.84 For number of steps: 0.82 For smoothness: 0.64	NA	NA	NA	NA	NA	NA
	Wong et al., 2013	Total of 64 elderly participants; 35 with chronic stroke and 29 healthy elderly (age information not available) in Hong Kong	NA	Excellent intra-rater, inter-rater and test-retest reliabilities (CC range 0.944–0.999)	NA	8.2 seconds	100%	89.2%	NA	NA
	Welch et al., 2016	Community-dwelling older adults from primary care (age range 70-82 y/o, median 76.5 y/o; n=428)	NA	NA	NA	poorer performance of F8WT by 1 second was associated with 8% greater rate of falls (RR= 1.08, CI: 1.03–1.14)	NA	NA	NA	NA
	Barker et al., 2019	Participants one year s/p Total Knee Arthroplasty home care and outpatient setting (70.3±7.4 y/o; n=74)	Correlated with TUG (r = 0.921); with Timed walk test were correlated for the overall sample (r = 0.834) and subgroups, Home (r = 0.864) and Clinic (r = 0.793)	Intra-rater reliability at 95% - 1.8 seconds. Inter-rater reliability at 95%, 1.2 seconds.	NA	NA	NA	NA	NA	NA

	Coyle et al., 2020	Community-dwelling older adults in Pennsylvania, USA; (80.7±7.8 y/o; n=421)	NA	NA	NA	Total number of steps ≤17 can distinguish between Global balance: excellent, very good, good and poor	64.6%	60.8%		
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## References

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Floor Rise Test (Supine to Stand Test)</b>	Klima et al., 2016	Community-dwelling adults (78.5±5 y/o; n=55)	NA	gait speed ( $r = -.61; p < .001$ ) grip strength ( $r = -.30; p < .05$ ) Timed Up and Go (TUG) performance ( $r = .71; p < .001$ )	NA	NA	NA	NA	NA	NA
	Arauyo et al., 2019	Community-dwelling adults (age range 51-80 y/o; n=6141)	NA	NA	NA	<8/10 high risk of all-cause mortality;  + 1 point increment 21% mortality reduction	NA	NA	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Fullerton Advanced Balance Scale (FAB)</b>	Rose et al., 2006	Community-dwelling adults with balance impairment (75±6.2 y/o; n=46)	NA	Test re-test 0.96 Inter-rater 0.94-0.97 Intra-rater 0.97-1.00	NA	NA	NA	NA	NA	NA
	Hernandez et al., 2008	Independent older adults (77±6.5 y/o; n=192)	NA	NA	NA	25/40 points	74.6%	52.6%	8% increase in chance of falls with each 1 point decrease in score	NA
	Schlenstedt et al., 2015	Idiopathic Parkinson's Disease (67.2±9.8 y/o; n=85)	Spearman 0.87	Inter and intra 0.99	NA	NA	NA	NA	NA	NA
	Chauhan et al., 2019	Post-stroke, community-dwelling, independent ambulatory (60.5±3.9 y/o; n=30)	Concurrent validity with BBS Spearman correlation coefficient (r) 0.86 p < 0.01	Spearman correlation coefficient (r) for intra rater reliability is 0.96; p < 0.01; inter rater reliability Spearman correlation coefficient (r) is 0.972, p < 0.01.	NA	NA	NA	NA	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Functional Ambulation Category</b>	Mehrholz et al., 2007	Acute stroke, inpatient rehabilitation setting (62.8±10.2 y/o; n=55)	NA	Test re-test Kappa .950  Inter-rater Kappa .905	NA	FAC score $\geq 4$ predicted community ambulation following 4 weeks of rehab at 6 months	100% for community ambulation	78% for community ambulation	NA	NA

**References:**

1. Mehrholz J, Wagner K, Rutte K, et al. Predictive validity and responsiveness of the Functional Ambulation Category in hemiparetic patients post stroke. *Arch Phy Med Rehabil.* 2007;88(10):1314-9.

Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Functional Gait Assessment</b>	Wisely et al., 2004	Participants from vestibular outpatient clinic (61.2±17.1 y/o; n=30)	Criterion Validity: Excellent concurrent validity with: Perception Dizziness Symptoms: ( $r=-.70$ ); Dizziness Handicap Inventory ( $r=-.64$ ) ABC ( $r=.64$ ); number of falls in previous 4 weeks ( $r=-.66$ ), DGI ( $r=.80$ ); adequate with TUG ( $r=-.50$ )	Excellent interrater reliability (ICC=.84)	8 points from admission to follow up	NA	NA	NA	NA	NA
	Walker et al., 2007	Community-dwelling healthy adults (age range 40-89 y/o; n=200)	NA	Excellent Interrater reliability (ICC=.93; $p<.001$ )	NA	NA	NA	NA	NA	NA
	Thieme et al., 2009	Patients after stroke up to 6 month (69.6±9.5 y/o; n=28)	Construct validity: excellent correlation ( $p<.001$ ) with Functional Ambulatory Category (.83), gait speed (.82), Berg Balance Scale (.93), Rivermead Mobility Index (.85), Barthel Index (.71).	Excellent Interrater reliability (ICC=.94)	NA	NA	NA	NA	NA	NA
	Wisley et al., 2010	Community-dwelling older adults (72.9±7.8 y/o; n=35)	Concurrent Validity and statistical significance excellent with BBS $r=.84$ ( $P<.000$ ); TUG $r=.84$ ( $P<.000$ ); with ABC scale $r=.53$ ( $P<.001$ ). Predictive validity: correctly identified 6/7 unexplained falls in the 6 months s/p the test	NA	NA	<22/30 predicting falls  <20/30 predict falls in next 6 months	85%  100%	86%  76%	58% (+) LR 3.6  43% (+) LR 5.8	100% (-) LR 0/NaN  100% (-) LR 0/NaN

	Lin et al., 2010	Acute and chronic stroke patients from outpatient rehabilitation (60.0±12.6 y/o; n=45)	Convergent validity: Excellent statistical association at 1st week, 2 months and 5 months post therapy with 10MWT ( $r=.61-.87$ ) and PASS ( $r=.74-.85$ )	Excellent test-retest reliability (ICC=.95, 95% CI)	4.2 (5 point) 14.4% change	NA	NA	NA	NA	NA
	Leddy et al., 2011	Community-dwelling older adults with Parkinson's Disease (68.2±9.3 y/o; n=80)	NA	Test-retest reliability Administered by student: excellent, ICC=.80; 95% CI=.58-.91; By a PT excellent, ICC=.9; 95% CI=.80-.96 Interrater reliability: ICC=.93; 95% CI=.84-.98	NA	<15/30 predictive of fall	72%	78%	(+) LR 3.24 PPV 59.6%	(-) LR .36 NPV 14.1%
	Ellis et al., 2011	Community-dwelling adults with Parkinson's Disease (age >40 y/o, details not available; n=263)	Concurrent validity and statistical sig Excellent with: Berg Balance Scale ( $r=.77$ ), PDQ-39 mobility subsection ( $r=-.66$ ), postural instability score ( $r=-.68$ ) Adequate with PDQ39 total score ( $r=-.57$ ), age ( $r=-.44$ ), bradykinesia composite score ( $r=-.55$ ), freezing of gait score ( $r=-.54$ ), functional reach ( $r=.52$ ), 9 hole peg test ( $r=-.52$ )	NA	NA	NA	NA	NA	NA	NA

	Duncan et al., 2012	People with Parkinson's Disease (67.5±8.8 y/o; n=51)	NA	NA	NA	<15/30 6-month prospective falls  12 months prospective falls	64%  46%	81%  81%	56% (+) LR 3.37  54% LR 2.42	15% (-) LR .44  24% (-) LR .67
	Marchetti et al., 2014	People from vestibular outpatient (60±18.3 y/o; n=326)	Responsiveness to change (disability reduction) when using DHI  Using ABC	NA	NA	6 points	50%  53%	60%  70%	NA	NA
	Yang et al., 2014	Patients with Parkinson's Disease from inpatient (61.9±10.8 y/o; n=121)	Construct validity: KMO-0.90, P<.001 Concurrent validity: BBS .85; FAC .78; TUG .57; ABC .72 MDS-UPDRS-03 .66 BI .69 Fast walk (m/s) .70 all P<.001	NA	NA	18/30 threshold for high sensitivity & specificity to predict falling	80.6%	80%	0.58%	0.92%

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Functional Independence Measure (FIM)</b>	Hobart et al., 2001	Participants from neurological inpatient rehabilitation (1 age range 6-77 y/o, mean 46.2 y/o; n=149)	Item Validity: Disability- 0.82, Cronbach's alpha; Handicap, physical health status, mental health status psychological distress, global cognitive function, responsiveness ranged 0.10-0.48 Internal Consistency: 0.53-0.87, Alpha coefficient 0.95 Concurrent Validity with Barthel Index, 18-item FIM, 30-item FIM+FAM: Pearson's $r=0.96-0.996$ , ICC =0.95-0.995	Intra-rater reproducibility: 0.98, ICC	NA	NA	NA	NA	NA	NA
	De Sousa et al., 2011	Community-dwelling older adults with Peripheral Vestibular Disorder ( $69 \pm 6.7$ y/o; n=50)	Correlation with DGI: $r=0.447$ , $p=0.001$ Used motor, cognitive & combination score of FIM	NA	NA	Greatest fall risk $P<0.001$ ; Mean: 116.5, Modified independence	NA	NA	NA	NA
	Fusco-Gessick et al., 2019	Retrospective data from adults patients in rehab hospital ( $\geq 18$ y/o, age information not available; n1=1,553, n2=12,301)	negative linear relationship between scores on the two-item metric and probability of falling, $r = -.877$	NA	NA	Total score AUC=0.78  Scores combined 2 subscales (Toileting Expression AUC=0.78	71.7%  68.5%	71.9%  73.8%	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Functional Reach Test (FRT)</b>	Thomas et al., 2005	30 frail older adults (Fallers average age 79.7 y/o; Non-fallers average age 81.4 y/o)	NA	Intra-rater reliability: .087, ICC	NA	18.5 cm; OR 5.28, CI 95%, $P=.076$	75%	67%	Fallers vs. non-fallers: $t=2.024$ , $P=.053$ , Power=.46	NA
	Katz-Leurer et al., 2009	45 acute stroke inpatient rehabilitation older adults (age information not available)	Responsiveness to paretic side (effect size 0.80) forward and nonparetic side (effect size 0.57 – 0.60; n=35)	Test-retest ICC range 0.90 – 0.95 (n=10)	NA	NA	NA	NA	NA	NA
	Merchán-Baeza et al., 2014	Older adults with acute stroke (mean age 76.7 y/o; n=5)	NA	Inter-rater 0.987 intra-rater 0.983	NA	NA	NA	NA	NA	NA
	Bohannon et al., 2017	Hypertensive Adults (mean age 80.6 y/o; n=199); Consolidated from 20 studies	Norm value provided	NA	NA	Hypertensive grp 27.5 cm (SD 7.2cm) Consolidated data 27.2 cm (SD 0.9cm)	NA	NA	NA	NA
	Lusardi et al., 2017	Systematic Review 95 studies ( $\geq 65$ y/o)	NA	NA	NA	<22cm	55%	93%	NA	NA
	Rosa et al., 2019	Systematic Review & Meta-analysis; 40 studies included; Older Adults ( $\geq 60$ y/o)	Functional Reach Test has a Non-significant association with fall history	NA	NA	Varied cut off scores from articles (16 cm to 24 cm)	45-68%	48-68%	NA	NA

**Note:** Since this outcome measure was developed, there have been several articles that reported data on areas of reliability, validity, etc. The older publications are not listed in this summary table, as this Toolkit focuses on recent articles. For further research, the Taskforce members suggest reading the earlier articles.

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Gait Abnormality Rating Scale (modified)</b>	VanSwearingen et al., 1996 (added additional data by Lusardi et al., 2017)	Frail Older Adults (74.8±6.75 y/o; n=52)	Concurrent validity: gait speed r = -0.679	Intra-rater reliability: Kappa 0.493-0.676 ICC 0.95-0.984 Interrater Reliability: Kappa 0.789-0.886 ICC 0.968-0.975	NA	>9	62%	87%	NA	NA

**Reference:**

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Gait Efficacy Scale (modified)</b>	Newell et al., 2012	Community-dwelling older adults (78.6±6.1 y/o; n=102)	FES r 0.80, ABC Scale 0.88, and Late Life FDI Overall Functional Subscale r = 0.88	Test-retest reliability: ICC 0.93 (95% CI 0.85-0.97) SEM 5.23	NA	NA	NA	NA	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Gait Speed (i.e., walking speed, self-selected walking speed, etc.)</b>	Verghese et al., 2009	Community-dwelling older adults (80 ±5.4 y/o; n=597)	NA	NA	NA	Risk ratio (RR) for falls per 10 cm/s decrease gait speed <70 cm/s = slow gait, RR 1.540, 95% CI 1.095-2.150 70-100 cm/s, RR 1.276, 95% CI 0.906-1.768	NA	NA	NA	NA
	Peel et al., 2013  <b>Systematic Review</b>	Community-dwelling adults, from clinical inpatient & outpatient settings (age ≥70 years, age details not available; n=7000)	NA	NA	NA	Community-dwellers 0.58 m/s usual pace and 0.89 m/s maximal pace; acute inpatient 0.46 m/s; outpatient settings 0.74 m/s	NA	NA	NA	NA
	Kon et al., 2013	Community-dwelling older adults with COPD (Gold Stage II-IV) (mean age 70, range 63-76 y/o; n=587)	NA	Inter-rater: ICC 0.99 Test-retest: ICC 0.97	Slow: <0.8m/s Normal: >0.8m/s	NA	NA	NA	NA	NA
	Hiengkaew et al., 2012	Chronic stroke.outpatient rehabilitation >6 months from initial event (63.5±10.0 y/o; n=43)	NA	Comfort-able speed: 0.96 m/sec Fast speed: 0.98 m/sec	(MDC 95%) Comfortable speed: 0.18m/s Fast speed: 0.13 m/s	NA	NA	NA	NA	NA

	Peters et al., 2013	Healthy older adults in retirement center (84.3±6.9 y/o; n=43)	0.99-1.00 between stopwatch and automatic timer	Test re-test ICC 10 m walk: 0.98 m/sec 4 m walk: 0.97 m/sec	4m: 0.02 m/s 10m: 0.01 m/s	NA	NA	NA	NA	NA
	Elbers et al., 2013	Community ambulators with Parkinson's Disease (67±7.54 y/o; n=153)	NA	NA	NA	0.88 m/s to predict community ambulation (70% accurate)	NA	NA	NA	NA
	Blankevoort et al., 2013	Older adults with Dementia from nursing home/day care centers (82.6±5.31 y/o; n=58)	NA	6 m walk test ICC 0.86	6 m walk test = 0.27 m/s	NA	NA	NA	NA	NA
	Bijleveld-Uitman et al., 2013	Community ambulatory adults with stroke from inpatient and outpatient programs (58.1±10.3 y/o; n=241)	NA	NA	NA	NA	89% (CI 95%; 0.85–0.91)	70% (CI 95%; 0.58–0.80)	92% (CI 95%; 0.89–0.95)	61% (CI 95%; 0.51–0.70)
	Bohannon et al., 2013	Patient with stroke From inpatient rehabilitation (62.0±13.7 y/o; n=35)	NA	NA	MDIC 0.13 m/s	NA	81%	71%	NA	NA

	Phillips et al., 2016	Independent older adults, aging in place facility (mean age 85.2 y/o; n=23)	NA	NA	NA	Cumulative decline in home gait speed 2.54 cm/s over 7 days, fall OR 4.22, 95% CI Cumulative decrease in home gait speed 5.41cm/s over 7 days 86.3% probability of falling over next 3 weeks	NA	NA	NA	NA
	Lusardi et al., 2017	Systematic review 95 studies ( $\geq 65$ y/o)	NA	NA	NA	<1.0m/s	69%	52%	NA	NA

**Note:** Since this outcome measure was developed, there have been several articles that reported data on areas of reliability, validity, etc. The older publications are not listed in this summary table, as this Toolkit focuses on recent articles. For further research, the Taskforce members suggest reading the earlier articles.

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Geriatric Fear of Falling Measure</b>	Huang et al., 2006	Summary of 2 descriptive cross-sectional studies in Taiwanese community dwelling older adults (pilot study n=100 and follow up validation n=354); age information not provided.	R=0.29 p=0.002 with FES	Test-retest 0.88 (p<0.0001), paired T-tests determined no significant difference in mean scores  Inter-rater 0.91 for Risk prevention, 0.94 for psychosomatic symptoms, and 0.89 for modifying behavior subscales at p<0.001 for all	NA	NA	NA	NA	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Global Deterioration Scale (Dementia assessment instrument)</b>	Reisberg et al., 1982	Older adults with dementia ( $\geq 65$ y/o; age details not available)	Stage progression correlated with CT scan: p<0.05	NA	NA	NA	NA	NA	NA	NA
	Reisberg et al., 1988	Older adults with dementia ( $\geq 65$ y/o; age details not available)	NA	Test-retest: Pearson's correlation coefficient:0.92	NA	NA	NA	NA	NA	NA
	Gottlieb et al., 1988	Patients with Alzheimer's Disease ( $72.8 \pm 7.3$ y/o; n=43)	NA	Inter-rater: ICC = 0.82	NA	NA	NA	NA	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
Groningen Activity Restriction Scale	Kempen et al., 1996	Community-based participants (age range 57-85 y/o; n=4789)	Concurrent validity against SF-20 (0.79)	0.91	NA	NA	NA	NA	NA	NA
	Metzelthin et al., 2011	Community-dwelling older adults (77.2±5.5 y/o; n=687)	With GFI: r = 0.57 With TFI: r = 0.61 With SPQ: R = 0.46	NA	NA	NA	NA	NA	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Grip Strength</b>	Sayer et al., 2006	Adults with fall history (age range 59-73 y/o; n=2148) in UK	NA	NA	NA	NA	NA	NA	NA	NA
	Pijappels et al., 2008	Healthy older adults (70±4.5 y/o; n=17)	NA	NA	NA	Discriminative model fallers vs non-fallers, no value reported	86%	80%	NA	NA
	Xue et al., 2011	Older women (age range 70-79 y/o; n=352)	declined grip strength inversely correlated with rate of falls (p<0.01)	NA	NA	NA	NA	NA	NA	NA
	Silva et al., 2015	Subjects with Parkinson's Disease (65.5±6.2 y/o; n=24) and healthy subjects (63.4±7.2 y/o; n=26)	NA	Inter-rater reliability ICC (2, 1) = 0.79-0.89	6.34-7.4mm Hg	NA	NA	NA	NA	NA
	Bertrand et al., 2015	Community people with acute stroke (age range 18-80 y/o; n=34)	NA	Test-retest reliability ICC = 0.95-0.99	2.73-4.68 kg	NA	NA	NA	NA	NA
	Agular et al., 2016	Community adults with subacute stroke (63±12 y/o; n=12) from Brazil	Concurrent validity with BBS (ρ=.91; P<.01) with gait speed (ρ=.67; P<.01)	Intra-rater reliability ICC (2, 1) = 0.64-0.99 Inter-rater reliability ICC (2, 1) = 0.66-0.99	95% CI 0.96-6.12 kg	NA	NA	NA	NA	NA
	de Souza Vasconcelos et al., 2016	Community-dwelling frail older adults (73.4±6.4 y/o; n=1374) from Brazil	NA	NA	NA	Predict mobility limitation Men= 25.8 kg Women=17.4 kg	Men 69% Women 60%	Men 73% Women 66%	NA	NA

	Jenkins et al., 2017	Older adults with sarcopenia (98 men, 76.8±6.3 y/o; 159 women, 75.9± 6.6 y/o; total n=257)	NA	Test-retest reliability ICC = 0.93-0.97	2.67-5.5 kg	NA	NA	NA	NA	NA
	Sampaio et al., 2017	Older adults from community centers (70±6.7 y/o; n=578) in Brazil	NA	NA	NA	Predict fear of falling: Men=30 kg; Women= 21.7 kg	Men 39% Women 29%	Men 94% Women 73%	Men 81% Women 67%	Men 71% Women 36%
	Ikegami et al., 2019	Community-dwellings older adults (age range 50-89 y/o; n=415) in Japan	NA	NA	NA	Shift of one Standard deviation increased fall risk by 39%	NA	NA	NA	NA

**Note:** Since this outcome measure was developed, there have been several articles that reported data on areas of reliability, validity, etc. The older publications are not listed in this summary table, as this Toolkit focuses on recent articles. For further research, the Taskforce members suggest reading the earlier articles.

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Hauser Ambulation Index</b>	Syndulko et al., 1996	Chronic Progressive Multiple Sclerosis (Age information not available; n=534)	NA	Test-retest: ICC= 0.91	NA	NA	NA	NA	NA	NA
	Sharrack et al., 1999	Patients with Multiple Sclerosis from clinic and long term residential care facility (age range 22-74 y/o; n=64)	NA	Intra-rater: ICC= 0.93; Interrater: ICC= 0.96	NA	NA	NA	NA	NA	NA
	Cattaneo et al., 2006	Adults with Multiple Sclerosis (age range 18-7 y/o; n=51)	With Berg Balance Scale: r= 0.74 With Dynamic Gait Index: r=0.80 With TUG: r= 0.74 With ABC scale: r=0.45 With Dizziness Handicap Inventory: r=0.32	With Functional Independence Measure: r=0.73  With Barthel Index = r-0.72  With SF-36 physical functioning: r=0.87	NA	NA	NA	NA	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric Property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff Score	Sn	Sp	PPV	NPV
<b>Hendrich II Fall Risk Model</b>	Ivziku et al., 2011	Older adults from geriatric unit of hospital (79.5±9.5 y/o; n=179)	NA	Inter-rater reliability: 0.87 (95%CI: 0.71-1.00)	NA	≥5 at risk for falling	86% (CI 95%: 67-1.04%)	43% (CI 95%: 34-51%)	11% (CI 95%: 0.051-0.17)	97% (CI 95%: 0.94-1.01)
	Aranda-Gallardo et al., 2013	Systematic review; acutely hospitalized adults (n=13,284)	NA	NA	NA	NA	62.8% (CI 95%: 54.9-70.2%)	64% (CI 95%: 63-65%)	NA	NA
	Nassar et al., 2013	Adult patients on the medical, surgical, oncology, and critical care units at a medical center (56.1±19.3 y/o; n=1815)	NA	NA	NA	NA	55.2%	89.3%	16.5%	98.3%
	Jung et al., 2018	Acutely hospitalized adults (age range 29-80 y/o; n=15,480) in Korea	NA	NA	NA	NA	80% (maximum point)	59% (maximum point)	NA	NA
	Park et al., 2018	Systematic review; Hospitalized Elders; included 3 studies specific to this scale (n=1754)	NA	NA	NA	≥ 4	Pooled 76% (95% CI 68–83%)	Pooled 60% (95% CI 57–62%)	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>High Level Mobility Assessment Tool</b>	Williams et al., 2006	Patient with Traumatic Brain Injury (age range 22-35 y/o; n=103)	NA	Inter-rater reliability: ICC=.99 Intra-rater reliability: ICC=.99	NA	NA	NA	NA	NA	
	Kleffellgaard et al., 2013	Patients with mild Traumatic Brain Injury at Oslo University Hospital (37.1±13.8 y/o; n=92)	NA	Inter-rater reliability: 0.99 (95% CI = .98-1.00) Intra-rater reliability: 0.95 (95% CI = .89-.98)	+/- 3.25 points	NA	NA	NA	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
Home Falls and Accidents Screening Tool	Mackenzie et al., 2002	Home visiting patients, in urban and rural settings (age information not available; n=40)	NA	Inter-rater reliability: 0.62	NA	NA	NA	NA	NA	NA
	Vu et al., 2012	Community-dwelling older adults (79.7±7.7 y/o; n=31)	NA	Inter-rater: 0.82 (95% CI, 0.66-0.91) Test-retest: 0.77 (95% CI, 0.57-0.88)	NA	NA	NA	NA	NA	NA
	Mackenzie et al., 2018	Older women (mean age 77.5, 74–82 y/o; n=567)	NA	NA	NA	9	73.9%	37.9%	30.6%	79.7%

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>International Physical Activity Questionnaire</b>	Kurtze, et al., 2008	Random sample of men (age range 20–39 y/o; n=108)	Vigorous PA, hours per week and days were most strongly correlated (respectively 0.41, 0.40 and 0.36, $r = p \leq 0.01$ ) with VO2max	ICC 0.30 for moderate activity hours, 0.80 for sitting hours	NA	NA	NA	NA	NA	NA
<b>Short version</b>	Lee et al., 2018 (systematic review)	Included 23 Studies from USA, Japan, Hong Kong, Switzerland, Canada, etc. Populations include military, chronic fatigue syndrome, schizophrenia, fibromyalgia, school students; 23 studies included (age range 20.8-65.2 y/o)	Small effect size when validated against other fitness measurements	NA	NA	NA	NA	NA	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>L Test of Functional Mobility</b>	Deathe, et al., 2005	Unilateral Amputee from Outpatients (mean age 55.9 y/o; n=93)	NA	Inter-rater ICC .96 Intra-rater ICC .97	NA	NA	NA	NA	NA	NA
	Rushton, et al., 2015	Amputee (60±13.0 y/o; n=33)	NA	NA	MCID 4.5 s	NA	NA	NA	NA	NA
	Haas et al., 2019	People with Parkinson's Disease (75±6.7 y/o; n=16).	Strong correlation with TUG on 2 different testing days $r = 0.96$ and $0.97$ ( $p < 0.001$ )	Test retest reliability ICC=0.97 (95% CI: 0.86 to 0.99)	NA	NA	NA	NA	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>LASA Fall Risk Profile</b>	Pluijm et al., 2006	Community-dwelling older adults (75.3±6.4 y/o; n=1,365)	NA	NA	NA	cutoff point of 5 (range 0–30)  cutoff point of 10	59%  31%	71%  92%	NA	NA
	Peeters, et al., 2010 (added additional data by Lusardi et al., 2017)	Older adults (77.9±7.1 y/o; n=408)	Area under the receiver operating (AUC) characteristic curve was 0.65(95% CI: 0.58, 0.72)	NA	NA	>8  >8	56.6% (CI: 51.8, 61.4)  63%	71.4% (CI: 67.0, 75.8)  63%	34.1% (CI: 29.5, 38.7),	85.6% (CI: 82.2, 89.0)
	Peeters et al., 2010 (added additional data by Lusardi et al., 2017)	Community-dwelling adults (age ≥65 y/o, age details not available; n=1,329) from Amsterdam	NA	NA	NA	>8	63%	61%	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
Late-Life Function and Disability Instrument	Jette et al., 2002	Community-dwelling older adults (75.9±8.5 y/o; n=150)	NA	Test-retest ICC (68–.82)	NA	NA	NA	NA	NA	NA
	Haley et al., 2002	Community-dwelling older adults (75.9±8.5 y/o; n=150)	NA	Test-retest ICC (.91 to .98).	NA	NA	NA	NA	NA	NA
	Sayers et al., 2004	Older men and women (80.8±0.4 y/o; n=101)	Moderately associated with the SPPB (r 5 0.65, Po.001), 400-m W gait speed (r 5 0.69, Po.001)	NA	NA	NA	NA	NA	NA	NA
	Beauchamp et al., 2014	Systematic review article (n=17,301)	There is extensive evidence to support the construct validity and sensitivity to change of the LLFDI among various clinical populations of community-dwelling older adults. Further work is needed on predictive validity and values for clinically important change.	NA	NA	NA	NA	NA	NA	NA
	Pandya et al., 2016	Breast Cancer African American survivors (59.7±7.2 y/o; n=181)	Cronbach alpha 0.91	NA	NA	NA	NA	NA	NA	NA

## References

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Missouri Alliance for Home Care (MAHC-10)</b>	Calys et al., 2012	Homecare patients (18-103 y/o; n=2,247)	Correlated with CT scan: p<0.05	NA	None reported	≥ 4	96.9%	13.3%	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Melbourne Fall Risk Assessment Tool (MFRAT)</b>	Barker et al., 2009*	Hospital and nursing home residents (81.6±10.7 y/o; n=87)	NA	Kappa k = 0.21	NA	NA	NA	NA	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Minimal Chair Height Standing Ability</b>	Reider et al., 2015	Community-dwelling older adults (83.6±1.3 y/o; n=167)	NA	NA	NA	Fallers vs Non-Fallers: 34 cm	75%	62%	NA	NA
	Lusardi et al., 2017	Systematic review; 95 studies included (≥ 65 y/o)	NA	NA	NA	NA	64%	66%	NA	NA

### References

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Mobility Interaction Fall Chart</b>	Lundin-Olsson et al., 2000	Residential care facility residents (mean age 82, age range 66-99 y/o; n=78)	NA	80% agreement (Kappa k = 0.6)	NA	Classified as high risk of falling, i.e., stopped walking at turns (log rank test 39.1; p<0.001; hazard ratio 12.1; 95% CI 4.6–31.8).	NA	NA	78% (CI = 67-87%)	88% (CI = 79-95%)

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Morse Fall Scale</b>	Baek et al., 2013	Retrospective inpatient hospital (151 fallers, 48.4±12.8 y/o; 694 non-fallers, 45.2±12.7 y/o; total n=845)	NA	NA	NA	51 (AUC = 0.77) points (pts)	72%	91%	63%	94%
	Nassar et al., 2014	Inpatient hospital data (56.1±19,3 y/o; n=1,815)	Cronbach's alpha r =0.64	Inter-rater reliability ICC =0.9	NA	51 pts	37%	54%	12%	98%
	McKechnie et al., 2016	Review/Discussion article	NA	Reliability established prior to 2015	NA	< 25 pts low fall risk 25-44 pts; moderate fall risk; ≥ 45 pts high fall risk	78%	83%	10%	99%
	Sardo et al., 2016	Hospital inpatients (mean age 65.5, 18-80 y/o; n=8,356)	NA	NA	NA	45 pts correlated with diagnosis and length of stay	NA	NA	NA	NA
	Bórikova et al., 2018	Long term care residents (82.8±5.9 y/o; n=89)	NA	NA	NA	44 pts correlated with fall history	NA	NA	NA	NA

## References

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Motor Fitness Scale</b>	Kinugasa et al., 1998	Community-dwelling adults ( $\geq 65$ y/o; age information not available; n=990)	NA	0.92	NA	NA	NA	NA	NA	NA
	Aoyama et al., 2015	Community-dwelling adults ( $60.9 \pm 12.1$ ; n=1,442)	NA	No association with fallers or non-fallers	NA	NA	NA	NA	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Multiple Lunge Test</b>	Wagenaar et al., 2012	Community-dwelling adults ( $77 \pm 7$ y/o; n=130)	NA	0.79-0.88	NA	NA	73%	63%	NA	NA

### References

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Multiple Sclerosis Walking Scale-12</b>	Nilsagard et al., 2009	Community-dwelling adults with Multiple Sclerosis (age range 25-75 y/o; n=20)	NA	NA	NA	≥ 75 pts	52%	82%	83%	50%
	Cavanagh et al., 2011	Community-dwelling adults with Multiple Sclerosis (57.6±12.7 y/o; n=21)	BBS -0.78	NA	NA	NA	NA	NA	NA	NA
	Motl et al., 2011	Community-dwelling adults with Multiple Sclerosis (age information not available; n=252)	NA	6 month 0.86; 12 month 0.87	NA	NA	NA	NA	NA	NA
	Learmonth et al., 2014	Community-dwelling adults with Multiple Sclerosis (49.2±9 y/o; n=82)	NA	NA	22 points for functional mobility	NA	NA	NA	NA	NA
	Motl et al., 2014	Community-dwelling adults with Multiple Sclerosis (49.2±9 y/o; n=82)	NA	NA	4-6 points with changes in walking ability	NA	NA	NA	NA	NA
	Goldman et al., 2017	Adults with Multiple Sclerosis (43.8±12.6 y/o; n=159)	Benchmark scores reflect to levels of function	NA	NA	NA	NA	NA	NA	NA
	Bennett et al., 2017	Adults with Multiple Sclerosis (53.2±9.2 y/o; n=50)	Correlated to TUG, DGI, 2MW, 6MW	Test-retest ICC: 0.86	NA	NA	NA	NA	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Peninsula Health Fall Risk Assessment Tool (PHRAT)</b>	Stapleton et al., 2009	Older adults with subacute & residential care, majority for orthopedic conditions; (78.8±6.2 y/o; n=291)	NA	good reliability ICC=0.79, but unclear if for 9-item and/or 4-item version	NA	4-item PHRAT at cutoff of 12  4-item PHRAT at cutoff of 14	76%  58%	76%  90%	NA	NA
PHFRAT 6-item	Barker et al., 2009	Older adults in residential and hostel care; 58% female; 61% assisted ambulation; most frequent diagnoses were dementia, osteoporosis and depression (81.6±10.7 y/o; n=87)	N/A	High interrater risk classification Reliability ( $\kappa=.84$ ).  Fair test-retest agreement ( $\kappa=0.68$ ).	N/A	16 = high risk	52%	66%	N/A	N/A

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
Physical Activity Questionnaire (CHAMPS Physical Activity Questionnaire)	Stewart et al., 2001	Underactive community-dwelling older adults (age range 65-90 y/o; n=249)	Construct validity with 6 Min Walk Test, Self-Reported Physical Functioning, 0.22-0.30, $P < .001$	Test-retest reliability 6 month $N = 91$ : Caloric expenditure ICCs 0.67 - 0.66; Frequency measures ICCs 0.58 -0.62	NA	NA	NA	NA	NA	NA
	Harada et al., 2001	Older community-dwelling adults and retirement home adults (mean age 64.0 y/o; n=87)	Construct validity with Physical Activity Survey for the Elderly (PASE) & Yale Physical Activity Survey (YPAS) 0.58- 0.68, $P < 0.0001$	Test-retest reliability 2 weeks: All physical measures ICCs = 0.59-0.69 Moderate-intensity measures ICCs = 0.72-0.79	NA	NA	NA	NA	NA	NA
	Hekler et al., 2012	Older community-dwelling adults (75.3±6.8 y/o; n=870)	Concurrent validity with accelerometer, $n = 850$ ; Spearman rank-order $p = 0.06$ -0.40, $P < .001$	Test-retest reliability, $N = 748$ ICCs = 0.56-.70	NA	NA	NA	NA	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
Physical Mobility Scale	Nitz et al., 2006	Adults residential care (age range 35-90 y/o; n=9)	Concurrent validity with Clinical Outcomes Variable Scale (COVS), per-item Spearman's rank-order correlations .69-.90, $P < 0.001$	Inter-rater reliability ICC 0.68-0.88  Test-retest reliability ICC $> 0.90$	NA	NA	NA	NA	NA	NA
	Barker et al., 2008	Older adults in residential care facilities. Cohort 1: 99 residents, 38% with dementia (85.22±5.1 y/o) Cohort 2: 87 residents, 51% with dementia, (81.59±10.69 y/o)	Internal construct validity Rasch analysis: residual mean value both cohorts = 0, SD=1.21 & 1.52 respectively, $P > .05$	Inter-rater reliability (28 participants) $k \geq .60$ all items except; sitting, stand to sit, mobility with $k = .46-.59$ CI 95%	4.39 pts, 90% confidence	NA	NA	NA	NA	NA
	Pike et al., 2010	Older adults in long term care (81.4±6.3 y/o; n=70)	NA	Intra-rater reliability ICC [3,1] = 0.982	MDC 3.98 pts, 95% confidence (n = 60)	NA	NA	NA	NA	NA
	Barker et al., 2012	Older adults in long term care (82±11 y/o; n=87)	NA	NA	NA	High fall risk: PMS score 28-36; Low fall risk: PMS score 0-9	NA	NA	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Physical Performance Test (PPT) 7 &amp; 9 item tests</b>	Reuben et al., 1990	Community and retirement home dwelling older adults with Parkinson's Disease (mean age 79, 46-94 y/o; n=183)	Concurrent validity 9 & 7-item tests: Roscow Breslau r = 0.80 & 0.69 Tinetti Gait score r = 0 .78 & 0.69 KATZ Activities of Daily Living r = 0.65 & 0.50	Reliability 9 & 7-item tests: Cronbach's alpha = 0.99 & 0.93 Inter-rater reliability: p = 0.99 & 0.93	NA	NA	NA	NA	NA	NA
	VanSwearingen et al., 1998 (added additional data by Lusardi et al., 2017)	Frail community-dwelling older veterans (75.5±7.3 y/o; n=84)	N/A	N/A	N/A	16+ to identify frequent fallers.	79%	71%	N/A	N/A
	Brown et al., 2000	Community-dwelling older adults (83±4 y/o; n=107),	Concurrent validity 9-item test: Balance – obstacle course, Berg Test, Full Tandem, Functional Reach r = -.793, .710, .600, .511 with P = <.005, .005, .001, .005 respectively Gait – Preferred gait speed, Fast gait speed, cadence, stride length, % gait cycle spent in stance, double stance time r = .528, .518, .427, .443, .487, .375 with P = <.05, .05, .005, .05, .05, .001 respectively	NA	NA	Frailty Cutoff Scores: Not frail 32-36 Mild frailty 25-31 Moderate frailty 17-24	NA	NA	NA	NA

	Lusardi et al., 2003	Community-dwelling older adults (82.7±7.9 y/o; n=76)	NA	NA	NA	Cutoff Frailty Scores: 9-item test – 32-36 not frail 25-32 mild frailty 17-24 moderate frailty < 17 unlikely to function in community 7-item test – < 19.4 moderate frailty 19.4-24.8 mild frailty	NA	NA	NA	NA
	Delbaere et al., 2006	Community-dwelling older adults (60+ y/o, detailed age information not available; n=257),	NA	NA	NA	Cut off score <19.	NA	NA	OR 4.16, 95% CI 2.22-7.79, P <0.001	NA
	Paschal et al., 2006	Community-dwelling older adults with Parkinson's Disease (62.4 ±6.3 y/o; n=14)	NA	Test-retest reliability ICC 7-item test 0.818; 9-item test 0.895, 95% CI	2.5 pts	NA	NA	NA	NA	NA
	Farrell et al., 2011	Community-dwelling older adults with dementia (76.6±9.5 y/o; n=34)	NA	7-Item Test: Intra-tester ICC .99, 95% CI Test-retest reliability ICC .90, 95%CI	NA	Cutoff score with best sensitivity & specificity = 19 points +Likelihood Ratio= 1.41, 95%CI (0.92,2.17)- Likelihood Ratio= .41, 95%CI (.10,1.59)	83%	41%	Likelihood Ratio 1.41, 95% CI	Likelihood Ratio. .41 95% CI

	Quinn et al., 2013	Subjects with Huntington Disease (52.1±11.8 y/o; n=75) Europe & US	NA	Test-retest reliability ICC=0.95 for persons with manifest HD	5 for persons with manifest HD	NA	NA	NA	NA	NA
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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Physiological Profile Assessment (PPA)</b>	Lord et al., 2003	Community and institutional older adults (age range 59-99 y/o; n=414)	Individual item validation performed from 1989-1996	Individual item reliability performed from 1989-1996	NA	NA	NA	NA	75% accuracy in determining elders at fall risk	NA
	Lorbach et al., 2007	21 Community-dwelling older adults with Alzheimer's Disease and 21 age- and sex-matched controls (79.3±6.3 y/o; n=42)	Sig (p<.05) difference between persons with Alzheimer's disease and controls for composite PPA (t40=-2.41), hand & foot reaction times, and coordinated stability.	Test-retest reliability: ICC composite PPA score = 0.69 [95% CI 0.37-0.86] ICCs for visual acuity, contrast sensitivity, knee extension strength, stability and max balance range from 0.78-0.90 ICCs for tactile sensitivity, ankle dorsiflexion strength, hand reaction time, sway/foam/EC range from 0.43-0.75 ICCs for proprioception, foot reaction time, sway/floor EO & EC, sway/foam/EO range from 0.18-0.39	NA	NA	NA	NA	NA	NA
	Delbaere et al., 2010 (added additional data by Lusardi et al., 2017)	Community-dwelling older adults (age range 70-90 y/o; n=500)	NA	NA	NA	>0.6	70%	44%	NA	NA

	Kuan et al., 2011 (added additional data by Lusardi et al., 2017)	Community-dwelling older adults (mean age 74.9 y/o, further age information not available; n=280)	NA	NA	NA	NA	57%	57%	NA	NA
	Liston et al., 2012	Older adult fallers from fall risk clinics (age range 60-90 y/o; n=865); Short version PPA	Sig difference between all age groups for contrast sensitivity, knee extensor strength, Sway/foam, fall risk score P<0.01	NA	NA	NA	NA	NA	NA	NA
	Sampaio et al., 2014	Community-dwelling older adults (75.2±5.17 y/o; n=10) in Brazil; Short version PPA	NA	Intra-rater reliability ICC(2,1): composite score .55 contrast sensitivity .94 proprioception .74 strength .93 reaction time .25 sway .24 Inter-rater ICC(2,1): composite score .69 contrast sensitivity .93 proprioception .92 strength .95 reaction time .54 sway .62 ICC composite PPA & test components; p<.005	NA	NA	NA	NA	NA	NA

	Hoang et al., 2016	Community-dwelling ambulatory adults with Multiple Sclerosis (51.5±2.0 y/o, n=416) Australia, UK, US; Short version PPA.	Correlated with EDSS category (Pearson correl coeff .478, p<.001), years since dx, and age. Frequent fallers (2+ falls in 3 months) scored sig worse on composite PPA and on 3/5 of its component tests (visual contrast, hand reaction time, sway).	NA	NA	NA	NA	NA	NA	NA
	Lusardi et al., 2017	Systematic review; 95 studies included (≥ 65 y/o)	NA	NA	NA	>0.6	66%	49%	NA	NA
	Gunn et al., 2018	Outpatient adults with Multiple Sclerosis (51±12.0 y/o; n=416)	NA	NA	NA	2.83 ( <i>Sn and Sp for this cutoff calculated from Table 3 data.</i> )	37%	80%	Independent prediction of fallers odds ratio 1.30, 95% CI 1.17-1.46	NA
	Liu et al., 2019	Community-dwelling older adults (61.2±7.2 y/o; n=137) in Hong Kong Short version PPA.	Concurrent validity with BBS (rho= 1.70, p<.001), FRT (rho= -.57, p<.001), TUG (rho= .49, p<.001). Moderate convergent validity with ABC-C (rho= -.35, p<.001).	Intra-rater: ICC: Composite score 0.74; Contrast sensitivity .89 Proprioception .62 Knee strength .94 Reaction Time .89 Sway .58 Inter-rater: ICC: Composite score 0.83 Contrast sensitivity .87 Proprioception .60 Knee strength .86 Reaction Time .83 Sway .56	NA	0.87	39%	82%	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
Push and Release Test	Jacobs et al., 2006	community-dwelling adults with Parkinson's Disease (67±12 y/o; n=88)	NA	ICC: 0.84-0.83	NA	NA	Trial 1: 100% Trial 3: 91%	NA	NA	NA

**References:**

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
Queensland Fall Risk Assessment Tool (QFRAT)	Barker et al., 2009	Long term care residents (81.59±10.59 y/o; n=87)	NA	Test-retest agreement k=0.88; Inter-rater agreement k=0.51	7.34	NA	61%	49%	NA	NA

**References:**

1. Barker AL, Nitz JC, Low Choy NL, et al. Measuring fall risk and predicting who will fall: clinimetric properties of four fall risk assessment tools for residential aged care. *J Gerontol A Biol Sci Med Sci.* 2009;64A(8):916–924.



Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Rivermead Mobility Index</b>	Nitz et al., 2006	9 Adults from residential care (age range 35-90 y/o) and 19 Physical Therapists	NA	Inter-rater reliability per 6 items: ICC 0.80-1.00; Test-retest reliability ICC >0.90	NA	NA	NA	NA	NA	NA
	Walsh et al., 2010	Mixed Neurological Adults (54.5±15.6 y/o; n=30)	Convergent validity between MRMI and the 10-m walk test, Spearman rho= 0.86	Inter-rater reliability ICC (95% CI)=0.93(0.86, 0.96)	NA	NA	NA	NA	NA	NA
	Quinn et al., 2013	Huntington Disease Adults (52.1±11.8 y/o; n=75) in Europe & US	NA	Test-retest reliability ICC=0.94 for persons with manifest HD	2 for persons with manifest HD	NA	NA	NA	NA	NA
	Tsang et al., 2014	Post stroke adults (70.0±11.4 y/o; n=456) in Hong Kong	NA	Test-retest reliability ICC <sub>1,1</sub> = 0.998; n=37	MDC (95%CI) = 1.3 pts	NA	NA	NA	NA	NA
	Rådman et al., 2015 (modified version)	Acute stroke patients (age information not available; n=37)	NA	Inter-rater reliability ICC 0.97; Intra-rater: reliability ICC 0.99	NA	NA	NA	NA	NA	NA
	Cho et al., 2015 (modified version)	Stroke patients (63.7±10.7 y/o; n=48) in Korea	Correlation of 0.545 to FES and 0.703 to BBS	NA	NA	NA	NA	NA	NA	NA

**Note:** This outcome measure is also validated in languages addition to English.

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Romberg Test</b>	Olsson Moller et al., 2012	Community-dwelling older adults.(81.5 ±6.3 y/o; n=152) in Sweden	NA	NA	NA	15 seconds	22%	91%	NA	NA
<b>Sharpened Romberg (SR)</b>	Gras et al., 2017	Community-dwelling older adults (71.8±7.8 y/o; n=100)	Convergent validity: SR Eyes Open: correlation with BBS (Pearson's Correlation coefficient with 95% CI=0.635) and TUG (-0.647); correlated with SR Eyes Closed: (0.496) and 10 MWT (0.447), p<0.01	<u>Inter-rater reliability</u> Eyes open- ICC =1.0 Eyes Closed- ICC=0.999 <u>Intra-rater Reliability</u> Eyes open- ICC=0.786 Eyes closed test ICC=0.701 <u>Test retest reliability</u> Eyes Open-ICC =0.589 Eyes Closed- ICC=0.670	NA	Study suggests 30 seconds EO as a balance screen, but provided no Sn or Sp metrics.	NA	NA	NA	NA
<b>Tandem Stance</b>	DePasquale et al., 2009 (added additional data by Lusardi et al., 2017)	Community-dwelling older adults (84±5.6 y/o; n=58)	NA	<u>NA</u>	NA	<22 seconds	72%	76%	NA	NA
	Muir et al., 2010 (added additional data by Lusardi et al., 2017)	Community-dwelling older adults (age range 65-90 y/o; n=117)	NA	<u>NA</u>	NA	<30 seconds	50%	62%	NA	NA

	Lusardi et al., 2017	Systematic review; 95 studies included ( $\geq 65$ y/o)	NA	<u>NA</u>	NA	<30 seconds	56%	65%	NA	NA
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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Self-Efficacy Scale (SES)</b>	Doba et al., 2016	Older adults (2.3±3.8 y/o; n=257)	Correlation between self-efficacy and score on clinical frailty scale; Significant relationships between self-efficacy and non-parametric variables like Beck depression inventory score ( $p<0.001$ ), physical strength or stamina and cognition or memory ( $p<0.001$ )	Cronbach's alpha = 0.79	NA	NA	NA	NA	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Short Health Form Survey (SF8, SF12, SF36)</b>	Bohannon et al., 2010 (added additional data by Lusardi et al., 2017)	Community-dwelling elder adults (80.8±7.2 y/o; n=58)	Convergent validity: significant Pearson correlations between the PFS and single limb stance time ( $r = 0.42$ ), Timed Up and Go test ( $r = -0.70$ ) performance, and gait speed ( $r = 0.75$ ).	Cronbach's alpha = 0.82	NA	<72.5	93%	66%	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
Short Physical Performance Battery	Freire et al., 2012	Older adults (age range 64-75 y/o; n=124) in Canada & Brazil	SPPB associated with various comorbidities (esp. depression and osteoarthritis), self-rated health, mobility disability, ADL function	Test-retest ICC = 0.83-0.89	NA	NA	NA	NA	NA	NA
	McGough et al., 2013	Residential care patients with Dementia or ALF (83.6±7.0 y/o; n=31) in USA	Correlations with age ( $r = -0.43$ ) and MMSE ( $r = 0.51$ ). Also correlations with spatiotemporal gait measures	NA	NA	NA	NA	NA	NA	NA
	Stookey et al., 2014	Stroke patients (61.5±9.8 y/o; n=43)	Significant correlation between SPPB and 6 MWT(0.76; $P < .001$ ) and between SPPB and peak O2 consumption during a graded exercise test( $r = 0.52$ ; $P < .001$ )	NA	NA	NA	NA	NA	NA	NA
	Veronese et al., 2014	Community dwelling older adults with fall history (age range 65-97y/o; n=2710) in Italy	SPPB scores 0-6 sig. more likely to be associated with recurrent fall hx (OR= 3.46/3.82 for females/males), as were scores 7-9 (OR = 2.03 women only) than those with scores 10-12.	NA	NA	Individual SPPB components in women: Gt speed <0.75m/s; chair stand >16.7 seconds; semi-tandem <10 seconds indicates recurrent fall risk	NA	NA	NA	NA

	Fox et al., 2014	Nursing home residents with dementia (83.3±9.9 y/o; n=12) in Australia	NA	Test retest ICC = 0.875 SPPB score; (lowest ICC = 0.49 balance; best ICC for chair stand 0.966)	NA	NA	NA	NA	NA	NA
	Bernabeu-Mora et al., 2015	Subjects with COPD (mean age 66.9 y/o, range 46-80; n=137)	Convergent Validity: Positive Moderate correlation with Quadriceps strength Correlation Coeff-0.49 Divergent Validity: Positive but weak correlation with hand grip strength (Correlation Coeff-0.28)	NA	NA	10 (SPPB score)	77%	70%	NA	NA
	Singh et al., 2015	Community-dwelling older adult with fall history (65.8±4.6 y/o; n=140) in Malaysia	Significantly correlated with ten step test, FRT, gt speed, TUG, and physiologic profile assessment. Those with high fall risk had significantly lower SPPB scores than low fall risk	NA	NA	NA	NA	NA	NA	NA
	Halaweh et al., 2016	Community-dwelling older adults with fall history (68.2±6.7 y/o; n=176) in Palestine	Correlated to FES scores. Significantly different SPPB scores for fallers and non-fallers.	NA	NA	NA	NA	NA	NA	NA
	Medina-Mirapeix F et al., 2016	Patient with Chronic obstructive pulmonary disease from Outpatient clinic (67±6.49 y/o; n=30) from Spain	NA	Inter-rater total SPPB score ICC = .92 (7-14 days apart) Inter-rater ICC = .84 for chair stand; ICC = .75 for gt speed; ICC = .33 balance subscale	NA	NA	NA	NA	NA	NA

	Jenkins et al., 2017	257 Community-dwelling adults with Sarcopenia (men 76.8±6.3 y/o; women 75.9±6.6 y/o)	NA	Test-retest ICC = 0.84-0.93 depending on assessment date comparisons (longitudinal study)	1.57-2.38	NA	NA	NA	NA	NA
	Buckinx et al., 2018	Frail nursing home residents (83.2±8.9 y/o; n=565) in Belgium	Lower SPPB scores in fallers than nonfallers. After adjusting for factors that differed between groups in regression, SPPB was not a significant predictor of falls	NA	NA	NA	NA	NA	NA	NA
	Hars et al., 2018	Geriatric acute and rehab hospital (85.0±6.9 y/o; n=807) in Switzerland	Correlation of SPPB with Tinetti and TUG were $r = -0.59$ and $-0.60$ , respectively. Regression models correlated poor SPPB and Tinetti performance with in hospital falls and injurious falls. Best prediction with combination of SPPB/TUG/history of falls	NA	NA	SPPB score <5 (determined by Youdon index)	In hosp. falls 88.6% Injurious falls 89.3%	In-hosp. falls 41.5% Injurious falls 39.7%	In hospital falls 27.1% Injurious falls 17.8%	In hospital falls 93.7% Injurious falls 96.1%
	Lauretani et al., 2018	Frail geriatric outpatient clinic patients (mean age 82.1±6.8 y/o; n=451)	Association with POMA; association with fallers OR 0.83; AUC = 0.676	NA	NA	NA	NA	NA	NA	NA



	Braun et al., 2019	Patients with cognitive Impairment from geriatric inpatients (82±7 y/o; n=65) in Germany	NA	Test-retest ICC = 0.97 (but with multiple cues for task – possibly invalidating test procedures); but large measurement error (SEM) indicating limited utility in this population	MDC <sub>90</sub> = 1.5	NA	NA	NA	NA	NA
	Trumpf et al., 2019	Acute geriatric psychiatric inpatients (74.8±6.7 y/o; n=56) from German	NA	In-pts with depression: test-retest ICC = 0.69 for 4m walk; and 0.95 for chair rise Healthy older adults 4m test-retest ICC = 0.89; chair stand ICC = 0.90	NA	NA	NA	NA	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Shuttle Walk or Incremental Shuttle Walk Test</b>	Singh et al., 2008	Participants from outpatient pulmonary rehab (69.4±8.4 y/o; n=372) from UK	Criteria of slightly better = 47m; better = 78.7m	NA	NA	NA	NA	NA	NA	NA
	Spagnuolo et al., 2010	Community-dwelling older adults (57±10 y/o; n=64) in Brazil	Significant correlations with BBS (r = 0.61) & TUG (-.65).	NA	NA	NA	NA	NA	NA	NA
	Bardin et al., 2012	Community-dwelling older females (68±7 y/o; n=33) from Brazil	Significant correlations with TUG (-.75) and BBS (0.50); Fallers performed significantly worse on ISWT	NA	NA	NA	NA	NA	NA	NA
	Hayashi et al., 2012	Independent older adults (age range 63-74 y/o; n=157) in Brazil	Sig. lower performance in older age; better ISWT sig. related to better postural control (COP measures)	NA	NA	NA	NA	NA	NA	NA
	Van Bloemendaal et al., 2012	Stroke patients from rehabilitation center (58.8±9.8 y/o; n=75) in Netherlands	correlated to 6-min walk test	Test-retest: ICC <sub>2,1</sub> = 0.961 (0.936-0.977); SEM = 6%	NA	NA	NA	NA	NA	NA
	Houchen-Wolloff et al., 2015	Patients from outpatient cardiac rehabilitation (65±10.5 y/o; n=220) in UK	NA	NA	MDC 70.0 meters or 25%	NA	NA	NA	NA	NA
	Costa et al., 2018	Patient with Asthma from outpatient (47±13.8 y/o; n=45) in Brazil	NA	Test-retest: ICC <sub>2,1</sub> = 0.98 (0.96-0.98)	NA	NA	NA	NA	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
Sickness Impact Profile Physical Dimension (SIP)	Carter et al., 1976	Patients assessed by their care providers (age range 18-74 y/o; n=1973)	Validation of scaled values by two different judgement groups, correlation $r = 0.092$ ; $p \leq 0.00001$	Reliability & consistency of judges of scaled items via deviate score was good for 284 items with 28 dropped or revised	NA	NA	NA	NA	NA	NA
	Bergner et al., 1976	Adults from outpatient (age range 18-75 y/o; n=278)	Criterion validity Category scores discriminated among subsamples ANOVA $F = 57.48$ , $p < 0.001$ Categories ambulation, mobility and confinement and leisure pastimes high correlation to sickness & dysfunction $r = .54$ , $p, 0.001$ Concurrent validity with Activities of Daily Living Index $r = .46$ , $P < 0.001$ Concurrent validity with National Health Interview Survey Data (NHIS) $r = .61$ , $p < 0.001$	NA	NA	NA	NA	NA	NA	NA
	Bergner et al., 1981	Total of 1976 Adults; including 696 enrolled in prepaid group practice; 696 from family practice; and 199 from outpatient (age information not available)	Concurrent validity with: Self-assessment & dysfunction $r = 0.63$ & $0.69$ National Health Interview Survey Data (NHIS) $r = .55$ $p < 0.001$	53 subjects used for test-retest reliability $0.92$ ; internal consistency Cronbach's alpha $0.94$	NA	NA	NA	NA	NA	NA

	Gerety et al., 1994	Older adults from nursing homes (78.2±10.2 y/o, n=231)	Convergent validity of SIP-NH Physical Dimension with: SIP Physical Dimension $r = 0.97, p < .001$ Katz Activities of Daily Living $r = .28, p \leq .001$ Physical Index $r = -.35, p \leq .001$ Geriatric Depression Scale $r = .21, p \leq .0002$ Folstein Mini-Mental State Exam $r = -.08$	NA	NA	NA	NA	NA	NA	NA
	Morishita et al., 1995	Older adults from outpatient geriatric clinic, (mean age 77.3; range 60-94 y/o; n=31),	Concurrent validity with Geriatric Depression Scale by Telephone $r = .90, p < .001$	NA	NA	NA	NA	NA	NA	NA
	Stalenhoef et al., 2002 (added additional data by Lusardi et al., 2017)	Community-dwelling older adults (77.2±4.9 y/o; n=311)	NA	NA	NA	≥8	13%	77%	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
Single Leg Stance (SLS)	Vellas et al., 1997	Community-dwelling older adults (72.7±6.1 y/o; n=316)	SLS for ≤ 5 seconds predicted injurious falls (RR 2.13) but not falls in general (RR 0.99). SLS predicted injurious falls better than age, gender, MMSE, gait abnormalities	NA	NA	Able to stand on one leg for ≥ 5 seconds considered “normal” performance	NA	NA	NA	NA
	Adkin et al., 2003	Community-dwelling older adults with Parkinson’s Disease (66.2 ± 9.3 y/o; n=58) and healthy controls (66.7±8.1 y/o; n=30) in Canada	UPDRS posture and gait score explained a significant amount of variation in stance duration for the 1 leg stance test (r=20.50; P 0.01)	NA	NA	NA	NA	NA	NA	NA
	Jacobs et al., 2006	Patients with Parkinson’s Disease (67±12 y/o; n=67) and age-matched controls (67±10 y/o; n=65)	NA	NA	NA	10 seconds	75%	74%	NA	NA
	Lin et al., 2007	Community dwelling adults (mean age 73.4 y/o; n=1200) from rural Taiwan	46.9% used an assistive device unable to do SLS; 40.7% with cognitive impairment unable; sig. worse SLS performance in older, if hx of falls, those needing AD, and those with ADL disability. Did NOT predict future falls	NA	NA	NA	NA	NA	NA	NA

	Springer et al., 2007	Community-dwelling military members, family, retirees (age range 18-99 y/o; n=549)	SLS times negatively related to age	Inter-rater reliability ICC-0.994 (95% CI 0.989 to 0.996) for eyes open best of 3 trials, ICC=0.998 (95% CI 0.996-0.999) for eyes closed best of 3 trials, ICC=0.951 (95% CI 0.926 to 0.969) for eyes open mean of 3 trials, and ICC=0.832 (95% CI 0.748 to 0.895) for eyes closed mean of 3 trials	NA	NA	NA	NA	NA	NA
	Goldberg et al., 2011	Community-dwelling adults (72.0±9.1 y/o; n=25)	NA	Test-retest ICC = 0.86	MDC (95%)=24.1 seconds; very large SEM (8.7 seconds)	NA	NA	NA	NA	NA
	Nguyen et al., 2012	Community dwelling older adults (78.1±5.4 y/o; n=765)	SLS correlated with other balance measures (center of pressure sway, SPPB, Berg)	NA	NA	NA	NA	NA	NA	NA
	Chomiak et al., 2015	community-dwelling people Parkinson's Disease (67.1±10.2 y/o; n=27) from Canada	NA	test retest reliability ICC 0.82 (95% CI: 0.64-0.91, P <0.01) and an ICC 0.83 (95% CI: 0.66-0.92, P<0.01) for right and left legs respectively	NA	NA	NA	NA	NA	NA



	Lusardi et al., 2017	Systematic review; 95 studies included ( $\geq 65$ y/o)	NA	NA	NA	< 12.7 seconds <6.5 seconds	63% 19%	49% 90%	NA	NA
	Porto et al., 2019	Community-dwelling older adults ( $67.27 \pm 4.29$ y/o; n=81) from Brazil	Higher peak hip abd/adductor strengths related to increase time in SLS	NA	NA	NA	NA	NA	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>St. Thomas Risk Assessment Tool (STRATIFY)</b>	Oliver et al., 1997	Older adults from hospital inpatients Phase 1, 116 patients (82.3±7.4 y/o) and 116 controls (84.6±7.0 y/o) Phase 2-217 patients, and Phase 3-331 patients (age information not available)	NA	NA	NA	>2 points	93%	88%	NA	NA
						>3points	92%	68%		
	Papaioannou A et al., 2004	Hospitalized patients (78±7.7 y/o; n=620) in Canada	Out of all STRATIFY test items, mental status was most predictive of falls (OR = 4.06)	Inter-rater reliability, ICC = 0.78	NA	NA	NA	NA	NA	NA
	Smith et al., 2006	Acute stroke patients from acute care center/teaching hospital (age range 34-100 y/o; n=620)	NA	NA	NA	>= 2 points at baseline	11.3%	89.5%	25%	76%
						>= 2 points at discharge	16.3%	86.4%	38%	66%
	Bentzen et al., 2006	Nursing home residents (84.6±8.1 y/o; n=1148) from Norway	Sig. more fallers had STRATIFY score >2; performance of STRATIFY no better than staff judgment	NA	NA	>= 2 points	30 day 65%; 90 day 58%; 180 day 56%	30 day 71%; 90 day 73%; 180 day 76%	30 day 31%; 90 day 45%; 180 day 51%	30 day 91%; 90 day 82%; 180 day 74%
	Milisen et al., 2007	Older adults from inpatient units (79.3±7.8 y/o; n=1602) in Belgium	NA	NA	NA	>= 2 points	57%	72%	15%	95%

	Webster et al., 2010	Hospitalized inpatients (77.7±7.9 y/o; n=788) in Australia	NA	NA	NA	>1 points >2 points >3 points >4 points	93% 82% 45% 25%	29% 61% 83% 95%	12% 18% 22% 35%	98% 97% 94% 93%
	Neumann et al., 2013	Patients geriatric clinic in hospital (median age 82, age range 65-101 y/o; n=4735) in Germany	NA	NA	NA	For “overall sample”, cut off not reported	58.9%	60.8%	15.3%	92.5%
	Latt et al., 2016	Participants at inpatient acute/subacute care unit (81.9±7.4 y/o; n=204) from Australia	PPVs slightly higher if patients had presented with fall or anti-psychotic use Ontario modified (OM) The Northern Hospital (TNH) Stratify (S)	NA	NA	STRATIFY ≥ 2 points  OM ≥ 9 points  TNH ≥ 3 points	S 80%  OM 80%  TNH 85%	S 61.4%  OM 37.1%  TNH 51.3%	S 17.4%  OM 11.4%  TNH 15%	S 96.8%  OM 94.8%  TNH 97%
	Strupeit et al., 2016	Geriatric hospital patients (83.5±8.2 y/o; n=124) from Germany	STRATIFY did not sig. correlate to falls	NA	NA	≥ 2 points used as cut off	t1 = 28.1% t2 = 37.5%	t1 = 68.4% t2 = 68.8%	t1 = 60 t2 = 10.7	t1 = 36.1 t2 = 91.7
	Peel et al., 2018	Patients admitted to acute hospital (80.8±6.7 y/o; n=1418) in Australia	NA	NA	NA	2 points AUC=0.64	56%	65%	NA	NA

**Note:** This outcome measure is also validated in languages addition to English.

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Stopping Elderly Accidents, Deaths, &amp; Injuries (STEADI)</b>	Rubenstein et al., 2011	Community-dwelling older adults ( $\geq 65$ y/o but no further age details available; n=40)	Concurrent validity of the Fall Risk Questionnaire (FRQ) with an independent geriatrician clinical fall risk examination items: fall past 6 month = Kappa 0.800 p <.0001 Fall concern = Kappa 0.700 p<.001 Feel unsteady = Kappa 0.500 p<0.001 Medication use = Kappa 0.832 p<.0001 Depressed = Kappa 0.694 p<.001 Assistive device = Kappa 0.698 p<.0001 Rest of items = Kappa 0.139 = .466	Overall FRQ items alpha =.795	NA	Indicated fall risk $\geq 4$	96-100% for original & Revision 2	66.7-83.3% for original & Revision 2	NA	NA
	Panzer et al., 2011	Community-dwelling older adults (age range 64-94 y/o; n=74)	Full Clinical Measures Set Concurrent validity with: Tinetti Performance Oriented Mobility Assessment (POMA) 0.5 – 1.0, Sensory Organization Test (SOT).41 - .79	Mobility Battery; 5 clinical variables ICC >0.6	NA	NA	AUC 80%	74%	NA	NA
	Stevens et al., 2013	18 Health care providers including 6 Geriatricians 6 PCPs; 4 RNs; 2 NPs	NA	Quantitative approach using focus groups to identify STEADI components	NA	NA	NA	NA	NA	NA

	Lohman et al., 2017	Community-dwelling older adults (age range 65-90+ y/o; n=7,392)	NA	NA	NA	NA	Discriminate between fallers AUC = 0.641	NA	Moderate Fall Risk OR = 2.62, High Fall Risk OR = 4.76, Moderate Multiple Fall Risk Category OR = 4.05, High Multiple Fall Risk Category OR = 13.7,	NA
	Nithman et al., 2019	Older adults who are community-dwelling and older adults from retirement facility (78.2±6.8 y/o; n=77)	STEADI correlated with gait speed (r = -.567) and Stay Independent Brochure (r = .514)	NA	NA	Stay Independent brochure score ≥4, and STEADI TUG>12 seconds; 30s chair stand cut off depends on age; tandem stand < 10 s	Retro-spective falls = 68.6%  Pros-pective falls = 68.4%	Retro-spective falls = 47.6%  Pros-pective falls = 44.9%	NA	NA

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Stroke Assessment Fall Risk</b>	Breisinger et al., 2014	Stroke patients from inpatient rehabilitation, including 68 fallers and 351 non-fallers (67.5±15.5 y/o; n=419)	NA	NA	NA	27; AUC=0.73	78%	63%	0.29	0.94

**References:**

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Stroop Stepping Test</b>	Schoene et al., 2014	Independent community - dwelling older adults (age range 70-93 y/o; n=103)	NA	game error associated with fall history OR 1.65	NA	NA		NA	NA	NA

**References:**

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Subjective Risk Rating of Specific Scales</b>	Hashidate et al., 2011 (added additional data by Lusardi et al., 2017)	Older adults from senior day care center (age ≥ 65 y/o, details not available; n=30)	NA	Intra-rater ICC=0.727-0.914	NA	≥2	82%	64%	1.8	3

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Survey of Activities and Fear of Falling in Elderly (SAFFE)</b>	Lachman et al., 1998	Older adults from senior housing community (76.2±1.9 y/o; n=270)	Correlated with Tinetti - 0.75	0.90	NA	NA	NA	NA	NA	NA
	Jonasson et al., 2014	People with Parkinson's Disease (73±8 y/o; n=102)	NA	Internal Consistency Cronbach's alpha= 0.94 Test retest Reliability: ICC=0.85	NA	NA	NA	NA	NA	NA

**References:**

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>The Obstacle Course</b>	Means et al., 1996*	Older adults with fall history (68.8±5 y/o; n=22) and older adults with no fall history (73.3±4 y/o; n=22) from rehabilitation clinic	NA	Inter-rater correlation 0.999; intra-rater correlation 0.98	NA	NA	NA	NA	NA	NA
	Ng et al., 2017	Stroke patients (57.9±5.5 y/o; n=29) and healthy community-dwelling older adults (63.6±5.6 y/o; n=30)	Positive correlation between obstacle course completion time (s) and TUG	Intra-rater reliability ICC <sub>2,2</sub> 0.937 (0.871-0.970) Inter-rater reliability ICC <sub>2,2</sub> 0.991 (0.980-0.996) Test-retest reliability ICC <sub>2,2</sub> 0.968 (0.932-0.985)	2.37 seconds	15.43 seconds (AUC=0.975)	96.6%	90.0%	NA	NA

**References:**

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2. Ng SS, Chan SC, Chan AK, et al. Reliability and concurrent validity of Standardized Walking Obstacle Course test in people with stroke. *J Rehabil Med.* 2017;49(9):705-14.

Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Timed Up and Go (TUG)</b>	Barry et al., 2014	Community-dwelling older adults (Meta-analysis; included 25 systematic review and 10 meta-analyses)	NA	NA	NA	≥13.5 seconds	32%	73%	NA	NA
	Chantanachai et al., 2014	Community- dwelling older adults (60-86 y/o; n=161)	NA	NA	NA	≥10.5 seconds	74%	57.7%	44.3%	83.1%
	Kojima et al., 2015	Community- dwelling older adults (72.6±5.9 y/o; n=60)	NA	NA	NA	≥12.6 seconds	30.5%	89.5%	46.2%	81.4%
	Zasadzka et al., 2015	Lower extremity Osteoarthritis older adults (73.1±6.5 y/o; n=187)	NA	NA	NA	≥ 13.5 seconds	NA	NA	NA	NA
	Vance et al., 2015	Older adults with Parkinson's Disease (71.4±8.3 y/o; n=36)	NA	NA	NA	≥12 seconds	41%	73%	NA	NA
	Rolenz et al., 2016	Community-dwelling older adults and older adults with and without cognitive impairments (age range 65-90 y/o; n=62)	With the 8-Foot Up and Go (r = 0.92)	NA	NA	≥13.5 seconds	23.6%	91.7%	NA	NA
			With the 8-Foot Up and Go (r = 0.85)	NA	NA	≥13.5 seconds	12.5%	100%	NA	NA
	Lusardi et al., 2017	Community-dwelling older adults; Systematic Review; 95 studies included (≥ 65 y/o)	NA	NA	NA	>7.4 seconds	56%	65%	NA	NA
						>12 seconds	31%	85%		
	Quinn et al., 2018	Patents with Multiple Sclerosis (mean age 52.6±10.7 y/o; n=101)	NA	NA	NA	≥9 seconds	82%	34%	NA	NA
	Chow et al., 2018	Older adults from emergency department (74.4±7.4 y/o; n=102) from Switzerland	NA	NA	NA	≥12 seconds	70.6%	28.4%	26.3%	72.7%

	Hars et al., 2018	Older adults from inpatient setting (85.0±6.9 y/o; n=807)	NA	NA	NA	>29.5 seconds OR = 2.91	61%	67.1%	27.2%	89.5%
	Reynaud et al., 2019	Patients with COPD from outpatient (66.2±8.2 y/o; n=50) in France				12 seconds 11 seconds	95.0% 100%	96.7% 96.7%	95.0% 95.2%	96.7% 100%
	Struble-Fitzsimmons et al., 2020	Patients from inpatient geriatric psychiatry units with and without fall history (64.9±8.6 y/o; n=62)	NA	NA	NA	16.5 seconds	79.3%	72.7%	NA	NA

**Note:** Since this outcome measure was developed, there have been several articles that reported data on areas of reliability, validity, etc. The older publications are not listed in this summary table, as this Toolkit focuses on recent articles. For further research, the Taskforce members suggest reading the earlier articles.

## References

1. Barry E, Galvin R, Keogh C, et al. Is the Timed Up and Go test a useful predictor of risk of falls in community dwelling older adults: a systematic review and meta- analysis. *BMC Geriatr*. 2014;14(1).
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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>TUG Dual Task-Cognitive</b>	Vance et al., 2015	Individuals with Parkinson's Disease (71.4±8.3 y/o; n=36)	NA	NA	NA	≥14.7 seconds	76.5%	73.7%	NA	NA
	Hofheinz et al., 2016	Community-dwelling older adults (72.2±6.8 y/o; n=120)	NA	NA	NA	>10 seconds	57%	70%	NA	NA
	Lusardi et al., 2017	Community-dwelling older adults ((Systematic Review/Meta-analysis, 95 studies included; ≥ 65 y/o)	NA	Interrater reliability for both cog and manual: ICC .99	NA	>13.5 seconds	80%	93%	84%	8%
	Quinn et al., 2018 (Systematic Review)	People with Multiple Sclerosis	NA	NA	NA	≥11 seconds	77%	30%	NA	NA
<b>TUG Dual Task-Manual</b>	Vance et al., 2015	Individuals with Parkinson's Disease (71.4±8.3 y/o; n=36)	NA	NA	NA	≥13.2 seconds	29.55%	68.4%	NA	NA
	Lusardi et al., 2017	Community-dwelling older adults ((Systematic Review/Meta-analysis, 95 studies included; ≥ 65 y/o)	NA	Interrater reliability for both cog and manual: ICC .99	NA	>13.5 seconds	80%	93%	84%	8%

## References

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
<b>Tinetti Performance-Oriented Mobility Assessment (Tinetti POMA); Tinetti Balance and Gait</b>	Contreras et al., 2012	Individuals with Parkinson's Disease from outpatient clinic (72±9.5 y/o; n=160)	NA	NA	NA	17.5 (Balance 11.5/16; Gait 10.5/12)	60% (Balance 71%; Gait 71%)	86% (Balance 79%; Gait 74%)	NA	NA
	Canbek et al., 2013	Individuals with stroke from inpatient (75±11 y/o; n=55)	Criterion validity against FIM motor domain; correlate with gait speed	NA	6	NA	NA	NA	NA	NA
	Kloos et al., 2014	Individuals with Huntington's disease (50.9±13.7 y/o; n=20)	Tinetti total score correlated significantly with all gait measures except swing percent in forward walking (p< 0.01)	Between session reliability ICC = 0.83 (95% CI, 0.70-1.00)	5	NA	NA	NA	NA	NA
	Knobe et al., 2016	Community-dwelling older adults (mean age 79.5; range 66-93 y/o; n=34)	NA	NA	NA	20	45%	69%	NA	NA
	Lusardi et al., 2017	Systematic review (included 95 studies; ≥ 65 y/o)	NA	NA	NA	<25	53%	69%	NA	NA
	Rovilta et al., 2019	Patients from rehabilitation center (69.3±16.8 y/o; n=90)	NA	NA	NA	<18	71%	0.81%	NA	NA

**Note:** Since this outcome measure was developed, there have been several articles that reported data on areas of reliability, validity, etc. The older publications are not listed in this summary table, as this Toolkit focuses on recent articles. For further research, the Taskforce members suggest reading the earlier articles.

### References:

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Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV
The University of Illinois in Chicago Fear of Falling Measure (UIC FFM)	Veloze et al., 2001*	Community-dwelling older adults (76±7.8 y/o; n=106)	NA	Cronbach $\alpha$ = 0.93	NA	NA	NA	NA	NA	NA
	Chen et al., 2014 (ISPRM proceeding)	13 American and 24 Chinese community-dwelling older adults (age range 60-97, mean age 81.9 y/o)	NA	NA	NA	37 (total 48) US AUC=0.80 China AUC=0.85	64% 67%	0.80 0.86	3.21 4.67	0.45 0.39

**References:**

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## Discussion

The Outcome Measure Toolkit project took over two years to complete, and an additional year to revise. After scouring the literature available to us, 245 different outcome measures were identified. Upon closer inspection of the psychometrics and levels of aid in predictability of falls, 137 of these measures, i.e., MMSE, were deemed irrelevant, as they were not directly related to balance, falls, or functional mobility. The remaining 108 measures were retained with varying degrees of applicability as genuine measures of falls risk. The taskforce performed a meticulous review of the psychometrics published for each of these measures, including the more recent studies published within the last five years. Seminal work, published between ten and twenty years ago, was also included in the summary tables if the outcome measure had no recent evidence. There are 91 summary tables presented in this document, due to there being no evidence in 17 of the outcome measures of psychometrics related to balance and falls assessment.

Our taskforce purposefully focused on proffering recent publications, that is, within the last ten years. Consequentially, some older but significant publications may have been omitted from this document. For optimal benefit, we recommend using this in conjunction with other resources. Although we did our best to be thorough in the reviewing process, some articles may have been missed, despite multiple reviews, updates, and cross validations. All feedback and suggestions are welcome! Ideally, the document must be updated every three to five years to remain topical; please do consider joining the taskforce to help our project stay up to date!

Psychometric analysis categorizes the measures into four groups: outcome measures with evidence of psychometric properties and falls risk predictability, outcome measures not supported in relation to falls/balance assessment in the older adult, outcome measures related to balance and falls risk assessment but warranting additional research for further validation, and outcome measures that are widely utilized, but with limited recent supporting evidence. Broken down, there were 20 (18%), 29 (27%), 44 (41%), and 15 (14%), respectively. Quality of statistical analysis in the area of falls risk predictability was not commonly found in publications released before 2008.

Several widely used outcome measures are not targeted at falls prediction in older adults, but do show emerging falls risk evidence and methods for falls prediction in populations of pediatrics, young adults, dementia, Parkinson's Disease, and Multiple Sclerosis, etc.

We hope this anthology alludes the gap of knowledge and kindles the drive towards prospective research focusing on falls risk predictability.



## Appendix

### a. Compiled List of Outcome Measures found during Phase 1 Search

- |  |   |  |
|--|---|--|
| 1. 10 meter Walk Test                                    | 26. Activity Measure for Post-Acute CARE (AM-PAC ADL)         | 47. CONFbal Scale of Balance Confidence                                |
| 2. 10 m Maximal Walking Speed                            | 27. AM-PAC Functional   | 48. Conley Scale   |
| 3. 10 m Timed Walk Test                                  | 28. Ankle Dorsiflexor Strength                                | 49. CSDD (Cornell Scale for Depression in Dementia)                    |
| 4. 100% Limits of Stability                              | 29. Anxiety and Depression Scale (HADS-A)                     | 50. Demura's Fall Risk Assessment Chart (DFRA)                         |
| 5. 10 Minute Walk Test                                   | 30. Area Ellipse of Postural Sway                             | 51. Dizziness Handicap Inventory                                       |
| 6. 10 Times Sit to Stand                                 | 31. Attitudes to Falls-Related Interventions Scales           | 52. Downton Fall Risk Index  |
| 7. 2 Min Salk  | 32. Back Scratch Test   | 53. Dual Task Gait Speed   |
| 8. 2 Step Test   | 33. Balance Evaluation Systems Test (BESTest)                 | 54. Timed Up and Go – Dual Task  |
| 9. 21 Item Fall Risk Index                               | 34. Balance Outcome Measure for Elder Rehabilitation (BOOMER) | 55. Dual Task Assessments  |
| 10. 25 Question Geriatric Locomotive Function Scale      | 35. Balance Self-Efficacy Test                                | 56. Dynamic Gait Index   |
| 11. 30 Second Chair Stand Test (30 Seconds Sit to Stand) | 36. Balance Self-Perceptions Test                             | 57. Elderly Fall Screening Test  |
| 12. 360 Degree Turn Time                                 | 37. Barthel Index   | 58. Elderly Mobility Scale   |
| 13. 4 Meter Walk Test                                    | 38. Bed Rise Difficulty (BRD) Scale                           | 59. Established Populations for the Epidemiologic Study of the Elderly |
| 14. 4 Stair Climbing Test                                | 39. Berg Balance Scale  | 60. Euroqual   |
| 15. 4 Square Step Test                                   | 40. BESTest   | 61. Fall Assessment and Intervention Record (FAIR)                     |
| 16. 4 Stage Test (STEADI)                                | 41. Brief BESTest   | 62. Fall Assessment Risk and Management Tool (FARAM)                   |
| 17. 5 m Walk Time  | 42. Brunel Balance Assessment                                 | 63. Fall Perception Questionnaire                                      |
| 18. 5 Times Sit to Stand                                 | 43. Canada Occupational Performance Measure                   | 64. Fall Risk Assessment Tool  |
| 19. 50 ft Speed Walk                                     | 44. Chair Stand Time  | 65. Fall Risk Assessment Tool for Older People                         |
| 20. 6 Minute Walk Test (6MWT)                            | 45. Clinical Test of Sensory Interaction and Balance (CTSIB)  | 66. Fall Risk for Older People in the Community Assessment             |
| 21. 8 Foot Up and Go Test                                | 46. Community Balance and Mobility Scale                      | 67. Fall Risk Questionnaire  |
| 22. Activities Specific Balance Confidence Scale (ABC)   |   |  |
| 23. Activities Specific Fall Caution Scale               |   |  |
| 24. Activity-Based Balance and Gait                      |   |  |
| 25. Alternate Step Test                                  |   |  |

68.	Falls Behavioral Scale	96.	Gait Abnormality Rating Scale	122.	International Physical Activity Questionnaire
69.	Falls Efficacy Scale (FES)	97.	Gait Efficacy Scale	123.	Katz Activities of Daily Living Index
70.	Falls Efficacy Scale - International	98.	Gait Initiation Time	124.	Knee Extension Strength (KES)
71.	Falls Prevention Strategy Survey	99.	Gait-Related Dual Task Tests	125.	L Test
72.	Falls Risk Assessment Tool	100.	Gait Speed (m/s)	126.	LASA Fall Risk Profile
73.	Falls-Efficacy Scale	101.	Gait Step Width	127.	Late Life Function and Disability Instrument
74.	Fast Gait Speed	102.	Geriatric Depression Scale (GDS)	128.	Lateral Plank Time
75.	Fear Avoidance Beliefs Questionnaire (FABQ)	103.	GDS-20	129.	Lateral Reach Test
76.	Fear of Falling (yes, no)	104.	GDS-5	130.	Lawton's Instrumental Activities of Daily Living scale
77.	Fear of Falling Measure	105.	Geriatric Depression Scale	131.	LE Strength/MMT
78.	FES	106.	Geriatric Depression Scale Short Form (GDS-15)	132.	Limits of Stability
79.	FES-1	107.	Geriatric Fear of Falling Assessment	133.	Missouri Alliance for Home Care (MAHC-10)
80.	FHI (Falls Handicap Inventory)	108.	Global Deterioration Scale	134.	Maximal Walking Speed
81.	FICSIT-4 Balance Test	109.	Goal Attainment Scale	135.	Maximum Step Length Test
82.	Figure 8 Walking Test	110.	Grip Strength	136.	Melbourne Fall Risk Assessment Tool (MFRAT)
83.	Functional Independence Measure (FIM)	111.	Groningen Activity Restriction Scale	137.	mFES
84.	Floor Rise Test	112.	Guralnik Test Battery	138.	Mini BESTest
85.	Floor Transfer	113.	Habitual Gait Speed	139.	Mini International Neuropsychiatric Interview
86.	Frenchay Activity Index	114.	Hospital Anxiety and Depression Scale (HADS)	140.	Mini Mental Assessment
87.	Fugl-Meyer Motor Assessment	115.	Hand Grip Test	141.	Mini Cog
88.	Fullerton Advanced Balance Scale (FAB)	116.	Hauser Ambulation Index	142.	Minimal Chair Height Standing Ability
89.	Fullerton Advanced Balance Scale	117.	Health-Related Quality of Life (HRQOL)	143.	Mini Mental State Examination (MMSE)
90.	Functional Ambulation Category	118.	Hendrich II Fall Risk Model	144.	Mobility Interaction Fall Chart
91.	Functional Fitness Test	119.	High Level Mobility Assessment Tool	145.	Modified Clinical Test of Sensory Interaction and Balance (mCTSIB)
92.	Functional Gait Assessment	120.	Home Falls and Accidental Screening Tool		
93.	Functional Independence Measure	121.	Illinois Fear of Falling		
94.	Functional Mobility Assessment Tools (FMA)				
95.	Functional Reach Test				

146. Modified Falls Efficacy Scale (MFES)	172. Push and Release Test	199. Sickness Impact Profile Physical Dimension
147. Modified Falls Efficacy Scale/ Short Falls Efficacy Scale	173. Quadriceps Strength	200. Single Leg Stance
148. Modified Functional Reach	174. Quantitative Gait Assessment	201. Single Limb Stance
149. Modified Gait Efficacy Scale	175. Queensland Fall Risk Assessment Tool (QFRAT)	202. Single Stance Time
150. Montly Fall Diaries	176. RAFS II	203. Sit and Reach Test
151. Morse Fall Scale	177. Rapid Step Test	204. 6 Minute Walk Test
152. Motor Fitness Scale	178. Reaction Time Tests	205. St. Thomas's Risk Assessment Tool (STRATFY)
153. Multi-Directional Reach Test	179. rFES	206. Stage 3 Balance Test
154. Multiple Lunge Test	180. Rhomberg Stance	207. Stair Climb Power Test (SCPT)
155. Multiple Sclerosis Walking Scale - 12	181. Rivermead Mobility Index	208. Static Posturography
156. Muscle Power	182. Rogers Modular Obstacle Course	209. STEADI
157. NeuroCom Balance Tests	183. Romberg Test	210. Step Quick Turn
158. Norwegian General Motor Function Assessment	184. SAFFE (Survey of Activities and Fear of Falling in the Elderly)	211. Step Reaction Time
159. One Leg Stance Test	185. Self-Reported Missteps (defined as a trip, slip, or other loss of balance in which recovery occurred to prevent a fall)	212. Step Test
160. Parameters of Gait	186. Self-Selected Gait speed	213. Step Up Test
161. Patient Specific Functional Scale	187. Self-Selected Walking Speed	214. STRATIFY (St Thomas Risk Assessment Tool)
162. Penisual Health Fall Risk Assessment Tool (PHRAT)	188. Self-Efficacy Scale (SES)	215. Strength Frail Older Adults Outcome Measure
163. Perceived Participation and Autonomy	189. Sensory Organization testing	216. Stride to Stride Variability
164. Performance Oriented Mobility Assessment (POMA)	190. SF-12	217. Stroke Assessment of Fall Risk
165. Performance Oriented Mobility Assessment - Balance	191. SF36	218. Stroop Stepping Test
166. Peter James Centre Fall Risk Assessment Tool	192. Short Falls Efficacy Scale International	219. Subjective Risk Rating of Specific Tasks (SRRT)
167. Physical Activity Questionnaire	193. Short Form Berg Balance Scale - 3 Point	220. Tandem Gait
168. Physical Mobility Scale	194. Short Physical Performance Battery (SPPB)	221. Tandem Stance
169. Physical Performance Scale	195. Short Form 12	222. Tandem Test
170. Physical Performance Test	196. Short Form 36	223. The Obstacle Course
171. Physiological Profile Assessment	197. Short Form Health Survey (SF-8)	224. The Step Test
	198. Shuttle Walk	225. Time to Walk 10 m
		226. Timed 25 Foot Walk Test
		227. Timed Get Up and Go Test
		228. Timed Tandem Stance

- |  |  |   |
|--|--|---|
| 229. Timed Up and Go                                     | 235. Toe Elevation Angles  | 242. Wall Sit Test  |
| 230. Timed Up and Go - Dual Task                         | 236. TUG Dual Tasking  | 243. Weight Bearing Symmetry                                      |
| 231. Tinetti Balance and Gait<br>Assessment              | 237. 2 Minute Walk Test  | 244. Western Ontario and McMaster<br>Osteoarthritis Index (WOMAC) |
| 232. Tinetti Balance and Gait<br>Evaluation              | 238. Unipedal Stance   | 245. World Health Organization<br>Quality of Life (WHOQoL)        |
| 233. Tinetti Gait and Balance Measure                    | 239. University of Illinois at Chicago<br>Fear of Falling Measure (UIC<br>FFM) |   |
| 234. Tinetti Performance-Oriented<br>Mobility Assessment | 240. Walking and Remembering Test  |   |
|  | 241. Walking While Talking Test  |   |

## **b. Outcome Measure Toolkit Project Article Review Instructions**

1. Each month, each taskforce member received five outcome measures to review with suggested search terms/keywords
2. At the end of the month (or as finished), members sent back the results in a word document (one table per outcome measure)
  1. Template was provided as well as two examples
3. Members were instructed:
  - a. If, in your research, you find that an outcome measure may not be appropriate, please flag it as such and let us know.
  - b. If you are finished early and have extra time to dedicate to the project, please let us know and we can send you additional measures to look up
  - c. If you cannot find evidence for a certain aspect (like reliability) don't worry! It's possible that many of these measures don't have psychometrics to support their use in certain areas.
  - d. We recommend that you use the name of the test as well as any similar names as listed in the Excel sheet. If you find a similar term used to describe the test, please let us know so we can add it to the main list.
  - e. It is also helpful to search the following keywords in addition to the name of the test:
    1. Validity
    - Reliability
    - MDC/MCID
    - Cutoff Score
    - Sensitivity
    - Specificity
    - Positive Predictive Value
    - Negative Predictive Value
  - f. Use “ “ to ensure your search terms come up in your search results and narrow down extraneous items
4. Each month, members had a conference call (2nd week of each month) to follow up on each person's progress. It was at this time that the taskforce shared aberrant findings such as:
  - Validated outcome measures without current (<5yr) evidence
  - Measures that might not be appropriate for consideration
  - Additional measures that should be included
  - Measures that were grouped d/t terminology but which should be separated
  - Measures that should be grouped with other measures d/t overt similarities
  - Not having access to an article (language, needing to pay for the article, access to data base)
  - Other problems that were identified

**c. Outcome Measure Summary Table Template**

Outcome Measure	Reference	Population/ Diagnosis	Psychometric property			Fall Predictability				
			Validity	Reliability	MDC	Cutoff score	Sn	Sp	PPV	NPV

Legend:

\* indicates the original article of the outcome measure.

NA = Not assessed

MDC = Minimum Detectable Change

Sn = Sensitivity

Sp = Specificity

PPV = Positive Predictive Value

NPV = Negative Predictive Value