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Functional Reach Test, Single-Leg Stance Test, and Tinetti Performance-Oriented Mobility Assessment for the Prediction of Falls in Older Adults: A Systematic Review

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ABSTRACT

OBJECTIVE: To systematically review the existing literature on the falls-related diagnostic test properties of the Functional Reach Test (FRT), Single Leg Stance Test (SLST), and Tinetti Performance Oriented Mobility Assessment (POMA) in older adults across settings and patient populations.

METHODS: Databases PubMed, EMBASE, and CINAHL were searched (inception-July 2020). Inclusion criteria were: participants aged 60 years or older, falls were recorded prospectively, and falls-related predictive validity was reported. Exclusion criteria: not published in English. Methodological quality of reporting was assessed using the Tooth Scale.

RESULTS: Of 1,071 studies reviewed, 21 met the inclusion criteria (12 POMA, 8 FRT, 6 SLST). Seven (58.3%) studies used a modified version of the POMA (POMA-m), while 3 (37.5%) used a modified FRT (FRT-m). For the outcome of any fall, the range of sensitivity and specificity was 0.076-0.615 and 0.695-0.97 for the POMA, 0.27-0.70 and 0.52-0.83 for the POMA-m, 0.73 and 0.88 for the FRT, 0.47-0.682 and 0.59-0.788 for the FRT-m, and 0.51 and 0.61 for the SLST in community-dwelling older adults. For the SLST, the sensitivity and specificity for recurrent falls in the community-dwelling setting were 0.33 and 0.712, respectively.

CONCLUSIONS: All the clinical tests of balance demonstrated an overall low diagnostic accuracy and a consistent inability to correctly identify fallers. None of these tests individually are able to predict future falls in older adults. Future research should develop a better

understanding of the role that clinical tests of balance play in the comprehensive assessment of falls-risk in older adults.

IMPACT STATEMENT: Neither the FRT, SLST, nor POMA alone show consistent evidence of being able to correctly identify fallers across fall types, settings, or older adult subpopulations. These clinical tests of balance cannot substitute a comprehensive falls-risk assessment, thus should be incorporated in practice solely to identify and track balance impairment in older adults.

MESH HEADINGS: systematic review, postural balance, gait, predictive value of tests, accidental falls

Word count text: 4485

INTRODUCTION

Falls are common among community-dwelling older adults with approximately 30% reporting at least one fall annually.[1] The immediate consequences of falls can be serious and include physical injuries such as fractures, bruises, and even death.[2] Research identifies balance impairment as a prominent and consistent risk factor for falls.[3,4] Accordingly, most falls prevention clinical practice guidelines include the assessment of balance as an essential component of falls risk evaluation.[5–7] Yet the research evaluating the diagnostic test properties of clinical tests of balance and thresholds for falls risk identification is contradictory. Physical therapists play an important role in the assessment and implementation of interventions to minimize the risk of falls in older adults.[8]

Highlighted by clinical guidance statements[8] and position papers,[9] current falls prevention clinical practice guidelines[5–7] offer limited direction to assist healthcare professionals with the selection of the most appropriate balance test to administer as part of a detailed assessment. Among Canadian physical therapists working with older adults, the most frequently used tests include the Berg Balance Scale (BBS), Timed Up and Go Test (TUG), Functional Reach Test (FRT), Single Leg Stance Test (SLST), and the Performance Oriented Mobility Assessment (POMA).[10] Although these tests may not be utilized to the same extent in other regions, they allow for the assessment of different balance components,[11] and can help guide individualized treatment; yet their utility for evaluating the risk for falls is inconsistent. For the BBS[12] and TUG,[13] there is little to no evidence of sufficient predictive validity to support their use alone in falls risk identification in community-dwelling older adults. Other tests, such as the FRT, SLST and POMA, assess functional stability limits and anticipatory postural control, single limb static stability, or are composed of challenging tasks that uniquely assess reactive control,

dynamic stability, and sensory integration, respectively.[14] It is therefore prudent to investigate the diagnostic accuracy of other commonly used tests, thus providing healthcare professionals with evidence-informed support for balance tests to use when working with older adults.

In 2007, Scott et al.[15] concluded that none of 38 tests could be recommended to be used alone for the clinical assessment of falls risk in older adults across settings and patient populations. Over the last 13 years, various systematic reviews have sought to provide updates.[16–18] Rosa et al.[16] cautioned the use of the FRT due to the variability between study protocols found regardless of setting. In healthy older adults, Jahantabi-Nejad et al.[17] recommend the POMA's use, yet no cut-off scores were provided to support clinical use. Lusardi et al.[18] assessed how the use of different clinical tests of balance affected the probability for falls in healthy, community-dwelling older adults. The SLST is suggested as an initial falls screening test by the authors while the POMA is not advocated for use over the BBS when looking to carry out a more detailed balance inquiry. Importantly, the available systematic reviews are either dated, specific to healthy community-dwelling older adults, did not provide information as to how heterogeneity among test protocols and designs was controlled when calculating single-point estimates (i.e., meta-analysis), or are problematic due to the inclusion of retrospective studies that can bias results.

The primary aim of this study was to systematically review the existing literature on the falls-related predictive validity of the FRT, SLST, and POMA in older adults across settings and patient populations.

METHODS

Data Sources and Searches

A detailed literature search of the databases PubMed, CINAHL, and EMBASE (inception-July 2020) was conducted in duplicate by trained reviewers working in pairs. The search strategy was composed of MeSH headings, keywords and operators generated in collaboration with a research librarian and informed by previous systematic reviews on this topic (Supplementary Table 1). The search strategy underwent preliminary testing prior to the initial database pull for accuracy. No filtering strategies were used. Reference sections of all articles and pre-existing systematic reviews were screened for additional papers. This systematic review was registered with PROSPERO (#42020156834) and was designed to follow PRISMA guidelines.[19]

Study Selection

Studies were included if they met the following criteria: participants were ≥60 years old, the occurrence of falls was prospectively recorded, and the diagnostic test accuracy for the FRT, SLST, or POMA was reported. Studies were excluded if: not in English, were non-peer-reviewed articles, or no data could be extracted. In order to report a true representation of the current state of the literature, all studies using the original, most common or modified versions for these clinical tests of balance were included.

Duplicates were detected after the initial search of the databases using the referencing software Mendeley Desktop (version 1.19.4), and each instance of duplication was manually checked prior to removal. Working in pairs, trained reviewers (KB, KB, JD, NL, SP, SS) completed the screening process and independently reviewed abstracts and titles using the inclusion and exclusion criteria. Agreement was required prior to entering the full-text review phase and any discrepancies were resolved by a third author (HO, SWH). For the full-text

analysis, the same reviewers worked to consensus in pairs to select which articles would be part of the final pool.

Clinical Balance Tests

Functional Reach Test (FRT)

The FRT measures the maximal distance an individual can move their center-of-mass towards the boundaries of their base-of-support.[20] In a relaxed standing stance, participants are instructed to flex their right shoulder anteriorly to 90° and then reach as far forward as possible with their hand closed (palm down). The examiner records the location of the 3rd metacarpal using a yardstick attached to a wall (level of acromion) both before and after the reach, with the difference indicating their performance. A trial is repeated if the participant takes a step or touches the yardstick. The FRT performance is reported in inches (continuous) and requires a 48-inch yardstick. Two practice and three recorded trials are completed, with the average being the overall score. The FRT is reliable in older adults,[20,21] older adults with stroke,[22–24] older adults with Parkinson's disease,[25,26] and older adults with dementia.[27]

Single Leg Stance Test (SLST)

The SLST measures static balance by challenging participants to stand unassisted on one leg.[28,29] No consensus currently exists for the SLST, although most commonly individuals stand for 30 or 45 seconds with their arms crossed across their chest or with their hands touching their hips.[30–32] The SLST may be completed with or without shoes and using the dominant or nondominant leg. The SLST may also be completed first with eyes open and then with eyes closed. Participants are timed as soon as their foot leaves the floor and stops once the foot touches the ground, the supporting foot shifts, their suspended foot touches the supporting leg, their eyes open in the eyes-closed trials, an arm is uncrossed or stops touching their hip, or the

maximum allotted time is reached. Three trials per condition are recorded, and either an average is calculated or the longest time is used. The SLST performance is reported in seconds (continuous) and requires a stopwatch. Protocols for the SLST are reliable in older adults,[33,34] adults with stroke,[35] adults with Parkinson's disease,[36] and adults with lower limb amputations.[37]

Performance Oriented Mobility Assessment (POMA)

The POMA was designed to measure both balance and gait in older adults.[38] The most common POMA version consists of 16-items: nine evaluate balance (POMA-B) and seven evaluate gait (POMA-G). Each item is scored on an ordinal scale from 0-2 with lower values indicating impairment and a maximum score of 28 (POMA-T).[39] For the POMA-B, participants start in a seated position (standard armless chair) and the following items are assessed: sitting balance, sit-to-stand, attempts at sit-to-stand, immediate standing balance, standing balance, backwards nudge, eyes closed standing balance, 360° turn, and stand-to-sit. For the POMA-G, participants first walk a 15-feet hallway using their assistive device at a usual pace and then at a "more rapid than usual" pace. The POMA-G items are: gait initiation, step length and step height, step symmetry, step continuity, path deviation, trunk stability, and gait stance. The POMA-B and POMA-G can be assessed as independent subscales. The POMA is reliable in older adults,[34,40–43] older adults with stroke,[44] older adults with Huntington disease,[45] older adults with Parkinson's disease,[46] and older adults with dementia.[42,47]

Data Extraction and Quality Assessment

The following information was extracted from articles and reported according to setting and patient population: sample size, falls incidence (proportion of people who fell during the study period, total falls, and falls rate), age (mean) and sex of participants, study length, inclusion and exclusion criteria, balance measure and protocol, and falls definition used. A

standardized data extraction sheet was used by the same trained reviewers to extract study relevant information in duplicate and guarantee accuracy.

The following predictive validity metrics were extracted: sensitivity, specificity, area under the curve (AUC), positive predictive value (PPV) and negative predictive value (NPV), positive likelihood ratio (LR+), negative likelihood ratio (LR-) and associated cut-off scores. Sensitivity is defined as the proportion of people who fall that the test correctly identified to be at high risk, while specificity is the proportion of people who do not fall that are correctly labelled as low risk by the test.[48] The AUC describes the relationship between sensitivity and specificity for a given test and is considered a metric of the overall diagnostic accuracy (<0.50: non-discriminative, 0.50-0.70: low, 0.70-0.90: moderate, >0.90: highly discriminative).[48] The PPV describes the proportion of people deemed high risk that had a fall, while the NPV is the proportion of people deemed low risk that had no fall.[48] The LR+ describes the likelihood of being labelled high risk in those that have fallen compared to non-fallers, while the LR- describes the likelihood of being labelled low risk in those that have fallen compared to non-fallers.[48] A useful clinical test would involve an LR+ >1.0 or an LR- <1.0, while an LR close to 1 contains no clinical value.[48] All measures of predictive validity were extracted and reported separately according to the type of fall (i.e., any fall, injurious, recurrent).

All articles included in the final analysis were assessed for methodological quality of reporting using the Tooth Scale for observational longitudinal research.[49] The Tooth Scale contains 33-items that address study design, sample size, recruitment and selection, measurement and biases, data collection, data analyses, internal validity and external validity.[49] Each item is scored “Yes (1)”, “No (0)” or “Not applicable (0)”. The maximum score is 33 and higher scores indicate a better methodological quality of reporting. All articles were reviewed in duplicate by

trained reviewers (KB, KB, JD, NL, SP, SS) and any discrepancies were resolved by a third reviewer (HO, SWH). The Tooth Scale has been shown to be valid and reliable.[49]

Role of the Funding Source

The funders played no role in the design, conduct, or reporting of this study.

RESULTS

There were 1,071 database articles identified and 182 full-text articles screened for inclusion (See Supplementary Table 2). Overall, 21 studies met the inclusion criteria[40,41,47,50–67] (Figure 1). Twelve studies evaluated the POMA,[40,41,47,53,54,58,61–66] eight evaluated the FRT[41,50,55–57,59,66,67] and six reported on the SLST[41,51,52,55,56,60] (Table 1-5).

Study sample sizes ranged from 50-1,790 people, the average age ranged from 70.7 (4.6) to 85 (6.9) years, the follow-up period ranged from 23 days to 36 months, and the proportion of fallers (any) observed within the study period ranged from 11.0-71.2%. Only a minority reported the total number of falls observed or the rate of falls,[54,55,58,59,61,62,65] which ranged from 0.43-1.26 falls per person year in community-dwelling older adults. Study samples were comprised of older adults (n=18),[40,41,50–55,58–67] or those who were diagnosed with: frailty,[56] Parkinson's disease,[57] or dementia[47] (Table 1). Articles covered five settings: sixteen were community-dwelling,[41,50–57,61–67] two were institution-dwelling (long-term care),[40,47] one was inpatient acute care hospital,[58] one was inpatient rehabilitation,[59] and one was a mixed care setting.[60]

Sixteen studies evaluated the occurrence of any fall events (one or more),[41,47,50,52,55,56,58–67] six studies evaluated recurrent falls (≥2 falls),[40,50,51,53,54,57] and three studies evaluated injurious falls.[53,58,60] The tracking of falls was facilitated by: phone calls,[41,50–55,57,60–66] postcards, falls calendars, diaries or notebooks,[40,41,50,53,55,57,60–63] in-person interviews,[56,66,67] the examination of medical records,[58,59] or used a combination of these methods.[41,50,53,55,57,60–63,66] In sixteen

studies,[40,50–52,54–61,64–67] and as recommended by Lamb et al.,[68] a fall was defined as: "An unexpected event in which the participant comes to rest on the ground, floor, or lower level". Seven studies specified that falls would not include those caused by intrinsic events (e.g., seizures),[54,56,57,60,61,65,66] one reported that participants needed to reach a level below the waist,[64] and one described falls only as a biomechanical event.[62] Four studies did not report a falls definition.[41,47,53,63]

Methodological Quality of Reporting

The average Tooth Scale score was 20.5 (3.4) (range: 13-26) (Table 6). Similar Tooth Scale scores were observed across studies using the POMA (20.6 (3.6)), FRT (20.9 (2.8)), and SLST (21.2 (4.0)). The included manuscripts lacked information on: whether confounders were accounted for in the analyses (95.2%), if biases were assessed quantitatively (95.2%), the reasoning behind participant selection (85.7%), the reason behind non-consent (85.7%), if consenters differed from non-consenters (85.7%), and a sample size calculation (57.1%).

Functional Reach Test (FRT)

Five of eight studies using the FRT followed the protocol of the original test,[50,55,57,59,66] while three used a modified version (FRT-m)[41,56,67] (Table 2). For the FRT-m, studies did not ask participants to reach forward using a pronated, closed hand.[41,56,67]

Community-Dwelling Setting

Seven studies evaluated the FRT in a community-dwelling setting;[41,50,55–57,66,67] however, cut-off**s**, sensitivity or specificity was only present in **a** few studies (Table 5, Tooth Scale scores: 18-25/33). In a 14-month follow-up, Murphy et al.[66] reported that using a cut-off of ≤20.32 cm the sensitivity and specificity of the FRT were 0.73 and 0.88, respectively, for any fall event in a

general sample of older adults. For the FRT-m, Sugihara et al.[67] reported slightly lower values after a 3-month follow-up (cut-off: ≤14.5 cm, sensitivity: 0.682, specificity: 0.788).

Following older adults with frailty for 13 months, and using the FRT-m cut-off of ≤18 cm, Shimada et al.[56] reported a sensitivity of 0.47 and a specificity of 0.59 for any fall. While for a one-year follow-up of those with Parkinson's disease, Almeida et al.[57] reported a sensitivity of 0.56 and a specificity of 0.82 on recurrent falls (cut-off: ≤17 cm, LR+=3.16, LR-=0.53).

Inpatient Rehabilitation Setting

One study examined the FRT in an inpatient rehabilitation setting in older adults (Table 5, Tooth Scale score: 21/33).[59] For any fall, and using a cut-off score of <4 cm, Haines et al.[59] reported a sensitivity of 0.70 and a specificity of 0.43 (follow-up: 32 (26) days).

Single Leg Stance Test (SLST)

All studies instructed participants to stand on one leg for as long as they could, however some specified a maximum allotted time of 30 seconds,[55] 60 seconds,[52] or 120 seconds[56] (Table 3). Four studies detailed that participants were able to choose which leg they wanted to stand on.[41,51,52,60] Only two studies specified how many trials were collected and both reported only on the longest time attained.[55,56] All studies examined the eyes open condition and thus results are reflective of only this version.

Community-Dwelling Setting

Five studies assessed the falls-related predictive validity of the SLST;[41,51,52,55,56] however, only two studies reported sensitivity and specificity values[51,56] (Table 5, Tooth Scale scores: 15-19/33). For recurrent fallers over a one-year period, and using a cut-off ≤5 secs, Beauchet et al.[51] reported a sensitivity of 0.33 and a specificity of 0.712 (PPV=14.3%, NPV=58.2%). In older

adults with frailty followed for 13 months, and using a cut-off of ≤3 secs, Shimada et al.[56] reported a sensitivity of 0.51 and a specificity of 0.61 for the occurrence of any fall.

Mixed Care Setting

One study recruited both institutional and community-dwelling older adults (Table 5, Tooth Scale score: 21/33).**[60]** Regarding injurious falls over a 36-month period, Vellas et al.[60] reported a SLST sensitivity of 0.36 and specificity of 0.76 (cut-off: ≤5 secs, PPV=31%).

Performance Oriented Mobility Assessment *(POMA)*

Five studies (41.7%) used the most common version of the POMA or its subscales,[53,54,64–66] while the remaining seven (58.3%) modified the clinical assessment[40,41,47,58,61–63] (Table 4). For the most common version of the POMA, two authors reported only on the POMA-B,[65,66] one only on the POMA-T,[53] and two reported on both components.[54,64]

For studies that used modified versions (POMA-m), three provided a separate assessment for each component,[40,47,62] three only reported the POMA-m(T),[58,61,63] and one only the POMA-m(B).[41] A 14-item,[61,63] 13-item[41,62] and 8-item[40,47] POMA-m(B) were used. For the POMA-m(G), a 10-item[61–63] and 8-item[40,47] versions were used, while for the POMA-m(T) an abbreviated (max score=7)[58,62] or extended (max score=40) version was used[61,63].

Community-Dwelling Setting

For the outcome of any fall, nine studies in a general sample of older adults evaluated the POMA in the community-dwelling setting (Table 5, Tooth Scale scores: 13-21/33).**[41,53,54,61–66]** For the POMA-B, and using various cut-offs (range: ≤8-12/16) and follow-up periods (range: 6-14 months), the sensitivity was between 0.076-0.615 while the specificity was 0.695-0.97 (PPV: 20.0-36.4%).[64–66] For the POMA-G (cut-off: ≤8/12), Trueblood et al.[64] reported a sensitivity of 0.21 and a specificity of 0.95 for a 6-month follow-up. While for the POMA-m(T), and using

cut-offs between ≤30-36/40 over a one-year follow-up, sensitivity ranged between 0.27-0.70 and specificity was 0.52-0.83 (PPV: 30.8-48%, NPV=15.2%).[61,63]

Long-Term Care Setting

In a general sample of older adults followed for 10 months, Faber et al.[40] reported the recurrent faller specificity of the POMA-m(B) to be 0.661 (cut-off: ≤10/12), 0.625 for the POMA-m(G) (cut-off: ≤9/16), and 0.661 for the POMA-m(T) (cut-off: ≤19/28, Tooth Scale score: 21/33) (Table 5). The sensitivity of each POMA-m component was not provided separately and instead a summary score of 0.64 was reported. In older adults with dementia followed for 3 months (Tooth Scale score: 26/33), Sterke et al.[47] reported the following cut-offs provided the best predictive values: POMA-m(B) (cut-off: ≤11/16, sensitivity: 0.70, specificity: 0.51, PPV=35%, NPV=81%, AUC=0.67), POMA-m(G) (cut-off: ≤9/12, sensitivity: 0.70, specificity: 0.61, PPV=37%, NPV=81%, AUC=0.67), and POMA-m(T) (cut-off: ≤21/28, sensitivity: 0.85, specificity: 0.56, PPV=38%, NPV=89%, AUC=0.70).

Inpatient Acute Care Setting

In older adults, the falls-related predictive validity for the POMA-m(T) was similar for any falls (sensitivity: 0.924, specificity: 0.416, PPV=24.4%, NPV=96.4% LR+=1.58, LR-=0.18) and recurrent fallers (sensitivity: 0.931, specificity: 0.397, PPV=16.9%, NPV=97.7%, LR+=1.54, LR-=0.18) using a cut-off of >2/7 (Table 5, Tooth Scale score: 24/33).[58]

DISCUSSION

When used alone, the FRT, SLST and POMA are inadequate at identifying those who fall (<0.70 sensitivity), and most studies reported a low AUC discriminative value ranging between 0.50-0.70. Such results were observed for original, most common, and modified versions of these tests across settings and subpopulations of older adults. Therefore, and although these tests are

some of the most recognizable,[10] none can be recommended to be used in isolation for predicting future falls in older adults due to the lack of robust falls-related predictive validity.

The systematic review by Scott et al.[15] on the validity and reliability of falls risk assessment tests in older adults identified four studies that reported on the sensitivity and specificity of the POMA or the FRT. Consistent with our results, the authors concluded that no single test can be recommended due to a lack of comparable methodology and little evidence of appropriate diagnostic test accuracy. For community-dwelling older adults, only two other manuscripts has been published since 2007 on a modified version of the FRT (falls type: any, cut-off: ≤14.5 cm, sensitivity: 0.682, specificity: 0.788)[67] and the SLST (falls type: recurrent, cut-off: ≤5 seconds, sensitivity: 0.33, specificity: 0.712).[51] These two studies depict a low falls-related diagnostic accuracy for the FRT and SLST, with comparable results being observed in older adults with frailty,[56] those in inpatient rehabilitation,[59] and a mixed sample of community-dwelling and residential care older adults.[60] Although the POMA was the most studied of the clinical tests, little has changed regarding its validity for falls in older adults.[40,41,65,66,47,53,54,58,61–64] Specific to community-dwelling older adults, the only two studies[41,54] that have been published since the Scott et al.[15] systematic review either did not report the POMA cut-off scores used or did not report falls-related sensitivity or specificity values. This trend is also seen in studies spanning over different settings, including long-term care[40,47] and inpatient acute rehabilitation.[58] Our recommendation not to use the POMA alone for predicting future falls is also consistent with Lusardi et al.[18] Within their manuscript, a meta-analysis involving the POMA was only possible once data was modified to fit the same scale as a different scoring methodology was used among the studies captured. A comparison to other published systematic reviews is difficult to make as these have been restricted to a single clinical test of balance, included retrospective

studies, were limited to community-dwelling older adults, or only included healthy individuals.[16–18]

Our review identified 12 studies that evaluated the POMA, the large variation in protocols precludes discussion about the results as it was a single test. Specifically, only a minority of studies assessed the POMA using the most common version of the test; which to a lesser degree was also observed for the FRT. Across the three clinical tests of balance, differences among study protocols included the instructions on tasks, number of trials and items employed, tools used to record performance, and the scoring, analysis and reporting associated with the tests. Therefore, seeking to calculate single-point estimates in the form of a meta-analysis remains inappropriate. For a meta-analysis, researchers have had to rely on the use of retrospective studies, or have amalgamated studies with different reported follow-up times, falls types or test protocols; all of which severely limit how useful such results are for clinical use. Modified versions of these balance tests were prevalent, yet few overlapped even though all referenced the original or most common versions of the tests. For understanding the relationship between the performance of clinical balance tests and falls, any deviation from established protocols may result in imprecision and the under- or overestimation of the strength of the association between the variables of interest.

Each of the clinical tests of balance examined pose different challenges that may explain results. The POMA is composed of many tasks summed to create a composite score based on ordinal responses. Meaning, scores are representative of different balance components; some of which make up a greater portion of the final score than others. Moreover, at least some degree of judgement by the assessor is required and this can be issue (e.g., scoring balance as “unsteady”). The FRT and SLST are unique, yet arguably more difficult than other tests evaluating the same

balance components (e.g., extending the back, tandem stance). It is therefore expected that these tests would tend to be used only in certain settings and in healthy older adults. Nonetheless, the FRT, SLST, and POMA, are well-known, have proven psychometric properties,[20,21,37,40–47,22–25,27,33,35,36] and are valuable in identifying and tracking over time balance component deficits important to everyday mobility[11] and the effect of an intervention on physical function. In summary, healthcare professionals should not be discouraged from using these clinical tests of balance for the assessment of impairment, but should be warned that inconclusive or weak evidence exists linking individual FRT, SLST, and POMA performance to future falls in a general sample of older adults.

Our results were not unexpected knowing that other commonly used tests, such as the BBS,[12] TUG,[13] and the Four Square Step Test[69] also do not demonstrate an appropriate ability for predicting falls in older adults when used in isolation. For healthcare professionals, a focus should be placed on the assessment and intervention of balance deficits as opposed to the score in a particular test. Falls are multifactorial, the use of a single clinical test is flawed[15] and a comprehensive falls risk assessment should involve an investigation of the many other factors associated with falls that may not affect the performance of a balance test.[3] Prominent falls prevention clinical practice guidelines recommend the assessment of balance as part of a comprehensive evaluation.[5–7] Evidence exists of biologic interaction for falls risk, whereby the combined effect of polypharmacy and balance impairment results in an excess risk for falls compared to the addition of these individual risk factors alone.[70] This interaction between intrinsic, extrinsic and behavioral factors is likely present for other combinations of risks.[18] Importantly, the number of people identified as having a balance impairment is dependent on the test used and therefore measurement tools are not interchangeable or equivalent in defining an at-

risk population.[70] Although clinical tests vary in difficulty, and in the number and type of components of postural stability that are evaluated,[14] deficits in any component can lead to instability and falls.[11] Therefore, a purposeful approach involving multiple, uniquely challenging balance tests should be used in order to identify balance component deficits. Future collaborative efforts between healthcare professionals and researchers ought to be prioritized to establish better guidance for which clinical test of balance should be used and the relevant patient characteristics that influence test selection.

Limitations

The authors would like to acknowledge several limitations. Most studies included only assessed one clinical test of balance, and there was a lack of multiple reports across different settings and subpopulations of older adults. Studies specific to older adults with frailty, Parkinson's disease or dementia were limited and further research is critical prior to the generalization onto these subpopulations due to the variety of factors that may impact results (e.g., severity, cognitive impairment, etc.). **I**t is important to note that an unrestricted review protocol was used, and thus the results presented are representative of the current state of the literature. Regarding our systematic review, the methodological quality of reporting tool was chosen as it was believed to be the most appropriate for the assessment of observational longitudinal studies and allowed us to highlight areas to address in future research. Importantly, the Tooth Scale inquires into the index test reliability, reference standard validity, missing data, participants lost to follow-up, reporting of confounders, statistical analysis adjustments, and the qualitative and quantitative assessment of biases.[49] Although others tools are available,[71–73] these either make assumptions regarding the reference standard, are currently only applicable to patient-reported outcome measures and not clinician-reported outcome measures or

performance-based outcome measures, or were not designed for the examination of the predictive validity of clinical tests to adverse events such as falls. One study published in another language did not met any other exclusion criteria.[74] However, and as per the English written abstract, the POMA was not reported to have better falls-related predictive validity compared to the other tests assessed; making it unlikely that including this study would have impacted our conclusions.

CONCLUSIONS

Due to consistently low predictive validity across multiple metrics of diagnostic accuracy for falls, neither the FRT, SLST, or POMA can be recommended to be used alone for the purposes of predicting future falls in older adults. Instead, healthcare professionals should aim at identifying and tracking different aspects of balance control using a combination of clinical tests. Future research needs to continue to target gaps in the literature and develop an understanding of the role that clinical tests of balance play in the comprehensive assessment of falls-risk in older adults.

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Table 1: Description of articles included in the systematic review.

First Author, Year, Country	Sample Size n (% female)	Age Mean (SD)	Duration of Study	Eligibility Criteria	Clinical Test	Falls Type	Number of Fallers, n (%) Number of Falls, n Falls Rate
Community-Dwelling Setting							
Healthy Older Adults							
Hale et al. 1992[61] USA	120 (80)	74.7 (NR) years	12 months	**Inclusion Criteria:** - Ambulatory and cognitive competence. **Exclusion Criteria:** - No acute illness. - Not diagnosed with dementia.	POMA-m	Any	37 (36.3) 56 0.55 falls per person year
Topper et al. 1993[62] Canada	100 (83)	83 **(**6**)** years	12 months	**Inclusion Criteria:** - Able to stand independently. - Able to walk 10 meters. - Able to understand instructions. - Had not experienced a fall within 1 month prior to recruitment. **Exclusion Criteria:** NR	POMA-m	Any	59 (59.0) 120 1.20 falls per person year
Raiche et al. 2000[63] Canada	225 (NR)	80 **(**4.4**)** years	12 months	**Inclusion Criteria:** NR **Exclusion Criteria:** NR	POMA-m	Any	53 (23.6) NR NR
Trueblood et al. 2001[64] USA	180 (79.4)	77.9 **(**7.3**)** years	6 months	**Inclusion Criteria:** - ≥60 years of age. - Able to stand for a minimum of 5 min without an assistive device.	POMA	Any	30 (16.5) NR

				- Able to walk at least 40 feet with or without an assistive device. **Exclusion Criteria:** - MMSE score <24. - Underlying neurological conditions (PD, CVA).			NR
Verghese et al. 2002[65] USA	60 (56.6)	Fallers: 79.4 **(**5.7**)** years Non-fallers: 79.7 **(**6.6**)** years	12 months	**Inclusion Criteria:** - Healthy enough to attend clinic. **Exclusion Criteria:** - Living in the institutionalized care setting. - Non-English or Spanish speaking. - Severe visual loss.	POMA	Any	13 (22.0) 13 0.43 falls per person year
Murphy et al. 2003[66] USA	50 (74)	72.3 **(**8.6**)** years	14 months	**Inclusion Criteria:** - ≥60 years of age. **Exclusion Criteria:** NR	POMA, FRT	Any	16 (32.0) NR NR
Lin et al. 2004[41] China	1200 (41)	73.4 **(**NR**)** years	12 months	**Inclusion Criteria:** - ≥65 years of age. **Exclusion Criteria:** NR	POMA-m, FRT-m, SLST	Any	128 (11.0) NR NR
Sugihara et al. 2006[67] Japan	88 (NR)	80.6 **(**6.9**)** years	3 months	**Inclusion Criteria:** - Have no difficulty completing activities of daily living. **Exclusion Criteria:** - Any physical or sensory disturbance. - A diagnosis of dementia.	FRT-m	Any	21 (23.9) NR NR

Russell et al. 2008[50] Australia	344 (69.2)	75.9 **(**8.5**)** years	12 months	**Inclusion Criteria:** - ≥60 years of age. - Presented to emergency services due to a fall. - Walking independence. **Exclusion Criteria:** NR	FRT	Any, Recurrent (Any, ≥2 falls)	Any: 164 (47.6) Recurrent: 100 (29.1) NR NR
Beauchet et al. 2010[51] France	1759 (51)	70.7 **(**4.6**)** years	12 months	**Inclusion Criteria:** NR **Exclusion Criteria:** NR	SLST	Recurrent (Any, ≥2 falls)	Any: 341 (19.4) Recurrent: 222 (12.6) NR NR
Bongue et al. 2011[52] France	1790 (50.9)	70.7 **(**4.6**)** years	12 months	**Inclusion Criteria:** NR **Exclusion Criteria:** - Living in nursing home. - Neurological disease or peripheral neuropathy. - Unable to understand French or follow simple commands.	SLST	Any	563 (32.0) NR NR
Panzer et al. 2011[53] USA	62 (NR)	Non-fallers: 75.1 **(**6.5**)** years	12 months	**Inclusion Criteria:** NR **Exclusion Criteria:** - MMSE score <24.	POMA	Injurious, Recurrent (≥2 non-injurious fall or ≥1 injurious fall)	Injurious: 12 (19.4) Recurrent: 40 (64.5)

		Fallers: 80.1 **(**6.2**)** years		- Non-English speaking, legally blind or obese. - Diagnosis of neurologic, orthopedic or visual disorders.			NR NR
Bizovska et al. 2018[54] Czech Republic	131 (82.4)	70.8 **(**6.7**)** years	12 months	**Inclusion Criteria:** - ≥60 years of age. - No known neurological or MSK problem that may affect gait or balance. - Ability to stand and walk without any assistance or assistive device. **Exclusion Criteria:** - Any injury or surgery within last 2 years before baseline.	POMA	Recurrent (Any, 2^{+} falls)	Any: 50 (38.2) Recurrent: 15 (11.5) 76 0.58 falls per person year
Crenshaw et al. 2020[55] USA	125 (100)	77.1 **(**7.5**)** years	12 months	**Inclusion Criteria:** NR **Exclusion Criteria:** NR	FRT, SLST	Any	74 (59.2) 158 1.26 falls per person year
Older Adults with Frailty							
Shimada et al. 2009[56] Japan	455 (68.1)	80.5 **(**7.2**)** years	13 months	**Inclusion Criteria:** NR **Exclusion Criteria:** Non-ambulatory	FRT-m, SLST	Any	99 (21.8) NR NR
Older Adults with Parkinson's Disease							

Almeida et al. 2016[57] Brazil	225 (46)	70.7 **(**6.6**)** years	12 months	**Inclusion Criteria:** - Diagnosed with idiopathic PD by a certified neurologist (Brain bank clinical diagnostic criteria). - Able to walk with or without an assistive device. **Exclusion Criteria:** - Other neurological conditions. - Cognitive impairment**.** - Severe visual disturbance or vestibular dysfunction. - Comorbidities that affect balance and locomotion.	FRT	Recurrent (Any, 2^+ falls)	Recurrent: 84 (37.3) NR NR
Long-Term Care Setting							
Older Adults							
Faber et al. 2006[40] China	72 (81)	84.7 **(**6.1**)** years	10 months	**Inclusion Criteria:** - Able to walk at least 6 meters. - Capacity to understand instructions. - MMSE score >18. **Exclusion Criteria:** NR	POMA-m	Recurrent (Any, 2^+ falls)	Recurrent: 24 (33.3) NR NR
Older adults with Dementia							
Sterke et al. 2010[47] Netherlands	75 (64)	81 **(**8**)** years	3 months	**Inclusion Criteria:** - Residents in chronic care psychogeriatric department (diagnosis of dementia). - Able to walk without an assistive device. **Exclusion Criteria:** - Cognitive impairment.	POMA-m	Any	20 (26.7) NR NR

Inpatient Acute Care Setting							
Hars et al. 2018[58] Switzerland	807 (67.5)	85 **(**6.9**)** years	Average 23 (IQR: 14–36) days in hospital	**Inclusion Criteria:** NR **Exclusion Criteria:** - Unable to follow simple instructions.	POMA-m	In-hospital fall, Injurious fall, Serious injurious fall	Any: 189 (23.4) Recurrent: 70 (8.7) Injurious: 118 (14.6) Serious injurious: 21 (2.6) 329 13.8 falls per 1,000 patient bed days
Inpatient Rehabilitation Care Setting							
Haines et al. 2008[59] Australia	570 (57.8)	75.6 **(**13.5**)** years	Average 32 **(**26**)** days in hospital	**Inclusion Criteria:** - Admitted for inpatient rehabilitation. - Referred for physiotherapy services. **Exclusion Criteria:** - Paraplegia, tetraplegia, or a lower limb amputation.	FRT	Any	89 (15.6) 180 10.2 falls per 1,000 patient days
Mixed Care Setting							
Vellas et al. 1997[60] USA	316 (59.8)	72.7 **(**6.1**)** years	36 months	**Inclusion Criteria:** - No serious medical condition. **Exclusion Criteria:**	SLST	Any, Injurious	Any: 225 (71.2) Injurious:

				NR			70 (22.2) NR NR

Footnote: CVA, Cerebrovascular accident; FRT, Functional Reach Test; FRT-m, modified Functional Reach Test; IQR, interquartile range; NR, not reported; MMSE, Mini Mental State Exam; MSK, musculoskeletal; PD, Parkinson's disease; POMA, Tinetti Performance Oriented Mobility Assessment; POMA-m, modified POMA; SLST, Single Leg Stance Test.

Table 2: Descriptions of the Functional Reach Test protocols used in studies included in this systematic review for predictive validity of falls.

Study (First author, Year)	FRT Reported	Instructions	Trials	Tools	Measurement	Missing or Modified Details
Murphy et al. 2003[66]	FRT	Upper extremity flexed to 90 degrees. Reach forward as far as possible without stepping or falling.	2 trials. Average distance between trials.	Yardstick secured to the wall.	Inches.	Missing: foot position, arm used, hand placement, practise trial, collection trial (x1), measurement details. Modified: N/A.
Lin et al. 2004[41]	FRT-m	Stand by the wall, raise arm to 90 degrees, keep fingers extended, reach forward as far as possible without moving or lifting feel.	2 trials. Average distance between trials.	Yardstick secured to the wall (shoulder height).	Centimeters. Position of third fingertip measured by visual observation.	Missing: foot position, arm used, practice trial, collection trial (x1). Modified: hand placement, visual inspection of distance.
Sugihara et al. 2006[67]	FRT-m	Stand with the tip of the toes lined up with the starting line. Right shoulder flexion to 90 degrees, elbow fully extended and hand in pronated position. Instructed to reach forward as far as possible without lifting soles or rotating trunk and with hand fully extended. Participant needed to hold position for 5 seconds.	1 trial. Maximum distance recorded.	Yardstick secured to the wall.	Millimeters. Measurements taken from the tip of the middle finger.	Missing: practice trial, collection trial (x2). Modified: hand placement, position needed to be held for 5 seconds, number of trials.

Haines et al. 2008[59]	FRT	As per original test.	1 trial. Maximum distance recorded.	As per original test.	Inches. Distance of third metacarpal.	Missing: collection trial (x2). Modified: N/A.
Russell et al. 2008[50]	FRT	As per original test.	As per original test.	As per original test.	As per original test.	Missing: N/A. Modified: N/A.
Shimada et al. 2009[56]	FRT-m	Reach forward with both arms keeping a fixed base of support.	2 trials. Maximum distance recorded.	As per original test.	Centimeters.	Missing: collection trial (x1). Modified: reaching with both arms.
Almeida et al. 2016[57]	FRT	As per original test.	As per original test.	As per original test.	Centimeters.	Missing: N/A. Modified: N/A.
Crenshaw et al. 2020[55]	FRT	As per original test.	As per original test.	Yardstick secured to the wall.	Centimeters.	Missing: N/A. Modified: N/A.

Footnote: FRT, Functional Reach Test; FRT-m, modified Functional Reach Test; N/A, non-applicable; NR, not reported.

Table 3: Descriptions of the Single Leg Stance Test protocol used in studies included in this systematic review for predictive validity of falls.

Study (First author, Year)	Instructions	Trials	Measurement
Vellas et al. 1997[60]	Stand on leg of choice, flex opposite knee as to allow foot to clear the floor, and balance on one leg as long as possible.	NR	Time in seconds. Reported if participant**s** were able or unable to stand for 5 seconds.
Lin et al. 2004[41]	Stand with a comfortable base of support, eyes open, arms at the sides of the trunk and stand on any one leg for as long as possible.	NR	Time in seconds.
Shimada et al. 2009[56]	Stand on one leg for 120 seconds.	2 trials. Maximum time recorded.	Time in seconds.
Beauchet et al. 2010[51]	Stand on leg of choice, flex opposite knee as to allow foot to clear the floor, and balance on one leg as long as possible.	NR	Time in seconds. Reported if participant**s** were able or unable to stand for 5 seconds and whether there was a change in arm position in those first 5 seconds.
Bongue et al. 2011[52]	Start with a comfortable base of support, keep eyes open and stand on any one leg for as long as possible. Maximum time was 60 seconds per trial.	NR	Time in seconds and whether there was a change in arm position in the first 5 seconds.
Crenshaw et al. 2020[55]	Stand on one foot. Maximum time was 30 seconds per trial.	6 trials. Maximum time recorded.	Time in seconds.

Footnote: NR, not reported.

Table 4: Descriptions of the Tinetti Performance Oriented Mobility Assessment protocols used in studies included in this systematic review for predictive validity of falls.

Study (First author, Year)	POMA Test Reported	Total Score	Scoring	Items Included	Additional or Missing Items from Most Common Test Description
Hale et al. 1992[61]	POMA-m(T)	Maximum score of 40	NR	NR	NR
Topper et al. 1993[62]	POMA-m(B)	Balance subscale maximum score of 24.	NR	Balance subscale: 13 items (sitting balance, arises, sitting down, immediate standing balance, prolonged standing with eyes open, standing with eyes closed, nudge, turning and extending the neck, extending the back, turning 360°, standing on one leg for 5 seconds, bending down, and reaching up).	Additional items: • Turning the neck • Unilateral stance • Extending the back • Bending down and picking up an object • Walking and turning • Straightness of walking path • Ability to accelerate
	POMA-m(G)	Gait subscale maximum score of 16.	NR	Gait subscale: 10 items (gait initiation, step length, step height, step width, step symmetry, step continuity, straightness of walking path, trunk sway, ability to turn around, and ability to accelerate)	
	POMA-m(T)	Summary score was an abbreviated POMA with a maximum score of 7.	NR	Balance and Gait subscale: 7 items (sitting down, unilateral stance, turning 360°, nudge, trunk sway, ability to accelerate, and straightness of walking path).	
Raiche et al. 2000[63]	POMA-m(T)	Maximum score of 40	NR	Balance subscale: 14 items (max score out of 24) Gait subscale: 10 items (max score out of 16)	NR

Trueblood et al. 2001[64]	POMA-B	Balance subscale maximum score of 16.	As per most common test.	Balance subscale: 9 items.	All items included.
	POMA-G	Gait subscale maximum score of 12.	As per most common test.	Gait subscale: 7 items.	All items included.
Verghese et al. 2002[65]	POMA-B	Balance subscale maximum score of 16.	As per most common test.	Balance subscale: 9 items.	All items included.
Murphy et al. 2003[66]	POMA-B	Balance subscale maximum score of 16.	As per most common test.	Balance subscale: 9 items.	All items included.
Lin et al. 2004[41]	POMA-m(B)	Balance subscale maximum score of 26.	Each item was graded as 2 points (normal), 1 point (adaptive), or 0 points (abnormal).	Balance subscale: 13 items (sitting balance, sit to stand, immediate standing balance, standing balance, balance with eyes closed, turning 360, nudging the sternum, turning the neck, unilateral stance, extending the back, bending down and picking up an object, and sitting down).	Additional items: • Turning the neck • Unilateral stance • Extending the back • Bending down and picking up an object
Faber et al. 2006[40]	POMA-m(B)	Balance subscale maximum score of 16. Scoring differed on some items.	Each item was graded as 2 points (normal), 1 point (adaptive), or 0 points (abnormal). Sitting (2 points instead of 1), Attempts at rising missing (2 points), standing balance with eyes closed (2 points instead of 1).	Balance subscale: 8 items (sitting balance, rising from a chair and sitting down again, standing balance (eyes open and eyes closed) and turning balance).	Missing: • Attempts at rising.
	POMA-m(G)	Gait subscale maximum score of 12. Scoring differed on some items.	Each item was graded as 2 points (normal), 1 point (adaptive), or 0	Gait subscale: 8 items (gait initiation, step length, step height, step symmetry and continuity, path deviation, and trunk sway).	Additional items: • Turning while walking

			points (abnormal). Trunk sway (1 points instead of 2), turning while walking added (1 point)		
	POMA-m(T)	Summary score had a maximum score of 28. Scoring differed on some items.	Scoring differed from most common test.	N/A	N/A
Sterke et al. 2010[47]	POMA-m(B)	Balance subscale maximum score of 16.	Subscales were measured as abnormal (0) or normal (1), although in some cases, as adaptive (1) and normal (2). Some were scores as dichotomously (able/not able)	Balance subscale: 8 items (sitting balance, arises, immediate standing balance, prolonged standing balance, nudged, standing balance with eyes closed, turning balance, sitting down).	Missing: • Attempts at rising.
	POMA-m(G)	Gait subscale maximum score of 12.		Gait subscale: 8 items (initiation of gait, step length and height, step symmetry, step continuity, path, trunk and walking stance, and turning while walking).	Additional items: • Turning while walking
	POMA-m(T)	Summary score had a maximum score of 28.	Scoring differed from most common test.	N/A	N/A
Panzer et al. 2011[53]	POMA-T	Maximum score of 28.	As per most common test.	Balance subscale: 9 items (sitting balance, arises, attempts to arise, immediate standing balance, nudged, eyes closed, turning 360°, sitting down). Max. score of 16. Gait subscale: 7 items (initiation of gait, step length, step height, step symmetry, step continuity, path, trunk and walking stance). Max. score of 12.	All items included.

Bizovska et al. 2018[54]	POMA-B	Balance subscale maximum score of 16.	As per most common test.	Balance subscale: 9 items.	All items included.
	POMA-T	Maximum score of 28.	As per most common test.	N/A	N/A
Hars et al. 2018[58]	POMA-m(T)	Maximum score of 7. Higher values indicate worse performance.	Items were given a 0 if normal and 1 if abnormal.	Gait & Balance subscales combined: 7 items (sitting down, standing on one leg, turning 360°, nudged, trunk sway, walking pace, path deviation)	Missing: • Sitting balance • Arises • Attempts to arise • Standing balance – immediate and standing balance • Eyes closed • Initiation of gait • Step length and height • Step symmetry • Step continuity • Trunk sway • Walking stance Additional items: • Standing on one leg

Footnote: N/A, non-applicable; NR, not reported; POMA-B, balance POMA subscale; POMA-G, gait POMA subscale; POMA-m, modified POMA; POMA-T, total POMA including both balance and gait subscales.

Table 5: Measures of predictive validity for falls of the Functional Reach Test, Single Leg Stance Test, and Tinetti Performance Oriented Mobility Assessment in older adults.

Population	Falls Type	Cut-off Score	Sensitivity (95% CI)	Specificity (95% CI)	AUC	Predictive Values and Likelihood Ratios (95% CI)
Functional Reach Test						
Community-Dwelling Care Setting						
Healthy older adults	Any	FRT: NR[55]			0.49[55]	
		FRT: NR[50]			0.60 (0.54, 0.66)[50]	
		FRT: ≤20.32 cm[66]	0.73[66]	0.88[66]		
		FRT-m: NR[41]			0.509[41]	
		FRT-m: ≤14.5 cm[67]	0.682[67]	0.788[67]		
	Recurrent	FRT: NR[50]			0.62 (0.55, 0.68)[50]	
Older adults with frailty	Any	FRT-m: ≤18 cm[56]	0.47[56]	0.59[56]		
Older adults with Parkinson's disease	Recurrent	FRT: ≤17 cm[57]	0.56 (0.45, 0.67)[57]	0.82 (0.75, 0.88)[57]	0.74 (0.67, 0.79)[57]	LR+ = 3.16 (2.82, 3.53)[57] LR- = 0.53 (0.51, 0.57)[57]
Inpatient Rehabilitation Setting						
Older adults	Any	FRT: <4 cm[59]	0.70 (0.61, 0.79)[59]	0.43 (0.38, 0.47)[59]		
Single Leg Stance Test						
Community-Dwelling Care Setting						
Healthy older adults	Any	NR[55]			0.56[55]	
		NR[41]			0.527[41]	
		Dominant leg: <12.7 secs[52]			0.55 (0.53, 0.58)[52]	
		Non-dominant leg: <7.6 secs[52]			0.56 (0.53, 0.59)[52]	

	Recurrent	≤5 secs[51]	0.33[51]	0.712[51]		PPV = 14.3%[51], NPV = 58.2%[51]
Older adults with frailty	Any	≤3 secs[56]	0.51[56]	0.61[56]		
Mixed Care Setting						
Older adults	Injurious	≤5 secs[60]	0.36[60]	0.76[60]		PPV = 31%[60]
Performance Oriented Mobility Assessment						
Community-Dwelling Care Setting						
Healthy older adults	Any	POMA-B: ≤8/16[65]	0.076[65]	0.913[65]		PPV = 20.0%[65]
		POMA-B: ≤9/16[65]	0.23[65]	0.804[65]		PPV = 25.0%[65]
		POMA-B: ≤10/16[65]	0.615[65]	0.695[65]		PPV = 36.4%[65]
		POMA-B: ≤12/16[64]	0.24[64]	0.91[64]		
		POMA-B: ≤12/16[66]	0.55[66]	0.97[66]		
		POMA-G: ≤8/12[64]	0.21[64]	0.95[64]		
		POMA-m(B): NR[41]			0.559[41]	
		POMA-m(B): NR[62]	0.95[62]	0.16[62]	0.59[62]	PPV = 64%[62], NPV = 67%[62]
		POMA-m(G): NR[62]	1.0[62]	0[62]	0.57[62]	PPV = 61%[62], NPV = 0[62]
		POMA-m(T): NR[62]	0.93[62]	0.11[62]	0.62[62]	PPV = 62%[62], NPV = 50%[62]
		POMA-m(T): <30/40[61]	0.27[61]	0.83[61]		PPV = 48%[61]
		POMA-m(T): ≤33/40[63]	0.51[63]	0.74[63]		
		POMA-m(T): ≤36/40[63]	0.70[63]	0.52[63]		PPV = 30.8%[63], NPV = 15.2%[63]
	Recurrent	POMA-B: NR[54]	0.47[54]	0.89[54]	0.659[54]	
		POMA-T: NR[54]	0.67[54]	0.83[54]	0.757[54]	
		POMA-T: ≤26/28[53*]				
	Injurious	POMA-T: ≤26/28[53*]				
Long-Term Care Setting						
Older adults	Recurrent	POMA-m(B): ≤10/12[40]	0.64 (0.445,0.798)[40†]	0.661 (0.53, 0.771)[40]		
		POMA-m(G): ≤9/16[40]		0.625 (0.494,0.74)[40]		
		POMA-m(T): ≤19/28[40]		0.661 (0.53,0.771)[40]		
People with Dementia	Any	POMA-m(B): ≤10/16[47]	0.55[47]	0.61[47]	0.67 (0.52, 0.81)[47]	PPV = 34%[47] , NPV = 78%[47]
		POMA-m(B): ≤11/16[47]	0.70[47]	0.51[47]		PPV = 35%[47] , NPV = 81%[47]
		POMA-m(B): ≤12/16[47]	0.80[47]	0.44[47]		PPV = 34%[47], NPV = 84%[47]
		POMA-m(B): ≤13/16[47]	0.85[47]	0.34[47]		PPV = 32%[47], NPV = 84%[47]

		POMA-m(G): ≤8/12[47]	0.45[47]	0.68[47]	0.67 (0.53, 0.81)[47]	PPV = 37%[47], NPV = 78%[47]
		POMA-m(G): ≤9/12[47]	0.70[47]	0.61[47]		PPV = 37%[47], NPV = 81%[47]
		POMA-m(G): ≤10/12[47]	0.90[47]	0.39[47]		PPV = 34%[47], NPV = 89%[47]
		POMA-m(G): ≤11/12[47]	0.90[47]	0.17[47]		PPV = 29%[47], NPV = 80%[47]
		POMA-m(T): ≤19/28[47]	0.65[47]	0.61[47]	0.70 (0.53, 0.81)[47]	PPV = 36%[47], NPV = 81%[47]
		POMA-m(T): ≤20/28[47]	0.75[47]	0.61[47]		PPV = 28%[47], NPV = 84%[47]
		POMA-m(T): ≤21/28[47]	0.85[47]	0.56[47]		PPV = 38%[47], NPV = 89%[47]
		POMA-m(T): ≤22/28[47]	0.85[47]	0.51[47]		PPV = 36%[47], NPV = 88%[47]
Inpatient Acute Care Setting						
Older adults	Any	POMA-m(T): >2/7[58]	0.924[58]	0.416[58]		PPV = 24.4%[58], NPV = 96.4%[58] LR+ = 1.58 (1.44, 1.73)[58] LR- = 0.18 (0.09, 0.36)[58]
	Injurious		0.931[58]	0.397[58]		PPV = 16.9%[58], NPV = 97.7%[58] LR+ = 1.54 (1.41, 1.69)[58] LR- = 0.18 (0.07, 0.41)[58]

Footnote: AUC, area under the curve; FRT, Functional Reach Test; FRT-m, modified Functional Reach Test; LR+, positive likelihood ratio; LR-, negative likelihood ratio; NPV, negative predictive value; NR, not reported; POMA-B, balance POMA subscale; POMA-G, gait POMA subscale; POMA-m, modified POMA; POMA-T, total POMA including both balance and gait subscales; PPV, positive predictive value; *, Studies for which data was unable to be extracted as information was only provided through figures; †, Sensitivity was averaged across the three POMA subscales.

Table 6: Scores for each item of the Tooth Scale for articles included in the systematic review.

	Tooth Scale Item																																
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**Total**
Hale et al. 1992[61]	Y	Y	Y	Y	Y	Y	Y	N	Y	N	N	Y	N	N	Y	Y	N	Y	N	Y	Y	N	Y	Y	Y	Y	N	N	N	Y	N	Y	Y	21
Topper et al. 1993[62]	Y	Y	Y	Y	Y	N	Y	N	N	N	N	N	N	N	Y	Y	N	Y	N	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	Y	N	17
Vellas et al. 1997[60]	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	N	Y	Y	21
Raiche et al. 2000[63]	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	N	N	Y	Y	N	Y	N	N	NA	Y	Y	Y	Y	Y	NA	N	NA	N	N	N	N	13
Trueblood et al. 2001[64]	Y	Y	Y	Y	Y	N	Y	N	N	Y	Y	N	N	N	Y	Y	N	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N	N	N	N	20
Verghese et al. 2002[65]	Y	Y	Y	Y	Y	N	Y	N	N	N	N	N	N	N	Y	Y	N	Y	N	Y	Y	N	Y	Y	Y	Y	N	N	N	Y	Y	Y	Y	19
Murphy et al. 2003[66]	Y	Y	Y	Y	Y	N	Y	N	N	N	N	N	N	N	Y	Y	Y	Y	N	N	Y	N	Y	Y	Y	Y	Y	N	N	N	N	Y	Y	18
Lin et al. 2004[41]	Y	Y	Y	Y	Y	N	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	N	N	Y	N	N	Y	Y	25
Faber et al. 2006[40]	Y	Y	Y	Y	Y	N	Y	N	N	Y	Y	N	N	N	Y	Y	Y	Y	Y	Y	NA	Y	Y	Y	Y	Y	NA	N	Y	N	N	Y	N	21
Sugihara et al. 2006[67]	Y	Y	Y	Y	Y	N	Y	N	N	N	N	N	N	N	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	Y	N	18
Haines et al. 2008[59]	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	Y	Y	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	N	Y	N	N	Y	Y	21
Russell et al. 2008[50]	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	Y	Y	N	Y	N	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y	N	Y	Y	20
Shimada et al. 2009[56]	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	N	Y	Y	N	Y	N	N	NA	Y	Y	Y	Y	Y	NA	N	NA	N	N	Y	N	19
Beauchet et al. 2010[51]	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	N	Y	Y	N	Y	N	Y	N	N	Y	Y	Y	Y	N	N	N	N	N	Y	N	15
Sterke et al. 2010[47]	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	26
Bongue et al. 2011[52]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y	N	Y	Y	26
Panzer et al. 2011[53]	Y	Y	Y	Y	Y	N	Y	N	N	Y	Y	N	N	N	Y	Y	Y	Y	N	N	Y	N	Y	Y	Y	Y	Y	N	Y	N	N	Y	Y	21
Almeida et al. 2016[57]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	Y	Y	25
Bizovska et al. 2018[54]	Y	Y	Y	Y	Y	N	Y	Y	N	N	N	N	N	N	Y	Y	N	Y	Y	Y	N	N	Y	Y	Y	Y	N	N	N	Y	N	Y	Y	19

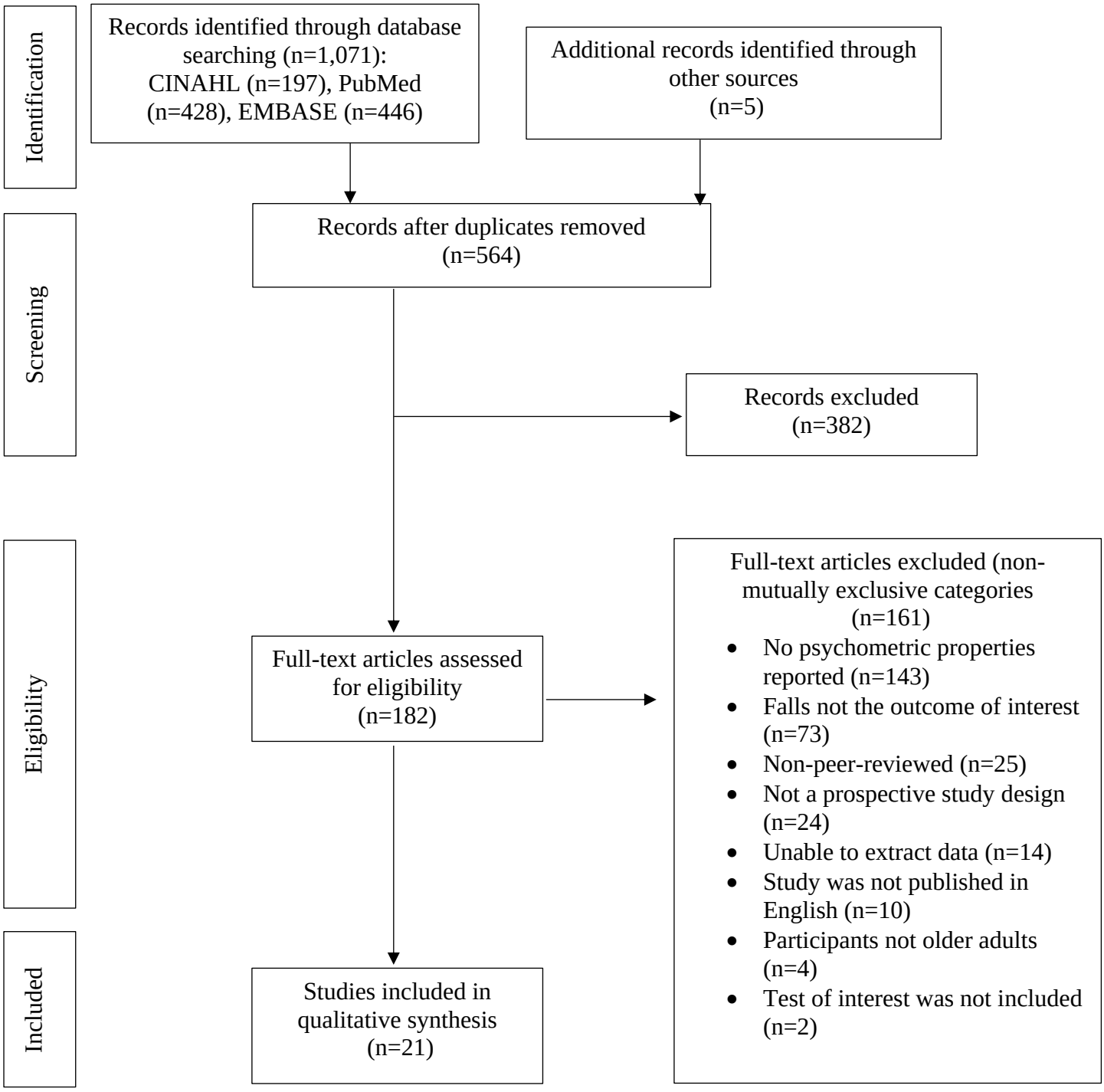
Hars et al. 2018[58]	Y	Y	Y	Y	Y	N	Y	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	NA	Y	Y	Y	Y	Y	NA	N	Y	N	N	Y	Y	24
Crenshaw et al. 2020[55]	Y	Y	Y	Y	Y	N	Y	N	Y	N	N	N	N	N	Y	Y	N	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N	N	Y	Y	21
Mean (SD)																																	20.5 **(3.4)**

Footnote: Y, yes; N, no; NA, not applicable.

FIGURE LEGENDS

Figure 1: Flow diagram of literature search **as per PRISMA guidelines.**

Figure 1.


Identification
Records identified through database searching (n=1,071): CINAHL (n=197), PubMed (n=428), EMBASE (n=446)
Additional records identified through other sources (n=5)
Screening
Records after duplicates removed (n=564)
Records excluded (n=382)
Eligibility
Full-text articles assessed for eligibility (n=182)
Full-text articles excluded (non-mutually exclusive categories (n=161)
No psychometric properties reported (n=143)
Falls not the outcome of interest (n=73)
Non-peer-reviewed (n=25)
Not a prospective study design (n=24)
Unable to extract data (n=14)
Study was not published in English (n=10)
Participants not older adults (n=4)
Test of interest was not included (n=2)
Included
Studies included in qualitative synthesis (n=21)

Supplementary Table 1: Sample search strategy used for PubMed Database.

Older adults: “Older” OR “senior” OR “seniors” OR “elderly” OR “elder” OR “elders” OR “adults” OR “older adults” OR “older adult” OR “geriatrics” OR “geriatric” OR “aged” OR “old people” OR “older people” OR “old adult” OR “aging” OR “old person” OR “old persons” OR “80 and over” OR “80 & over” OR “65 and older” OR “65 & older”

Test: “Functional reach test” OR “FRT” OR “modified functional reach test” OR “MFRT” OR “functional reach” OR “Tinetti” OR “Tinetti mobility test” OR “Tinetti performance oriented mobility assessment” OR “TPOMA” OR “POMA” OR “performance oriented assessment” OR “performance-oriented assessment” OR “performance-oriented mobility assessment” OR “performance oriented mobility assessment” OR “Tinetti balance and gait scale” OR “Tinetti balance and mobility scale” OR “TBMS” OR “single legged stance test” OR “SLST” OR “one legged stance test” OR “one leg balance” OR “one legged balance” OR “unipedal stance test”

Falls: “Falls” OR “falls risk” OR “accidental falls” OR “fall” OR “falling” OR “faller” OR “fallers” OR “non-faller” OR “non-fallers” OR “non faller” OR “non fallers”

Psychometric properties: “Diagnostic test” OR “diagnostic tests” OR “sensitivity” OR “specificity” OR “positive predictive value” OR “negative predictive value” OR “receiver operator curve” OR “area under the curve” OR “odds ratio” OR “positive likelihood ratio” OR “negative likelihood ratio” OR “prospective” OR “longitudinal studies” OR “predictive” OR “predict” OR “predicting” OR “predictive validity” OR “validity”

Supplementary Table 2: List of full-text articles reviewed and excluded with the reasons for exclusion from this systematic review.

Full Article Citation	Number of Exclusion Criteria	Reason(s) for Exclusion
Abasiyanik Z, Ozdogar A, Kahraman T, Ertekin O. Risk factors associated with falls in persons with multiple sclerosis: An observational study. Multiple Sclerosis Journal. 2018;24(2 Supplement):782.	2	Not a prospective study; grey literature (conference abstract).
Ali N, Luther SL, Volicer L, Algase D, Beattie E, Brown LM, Molinari V, Moore H, Joseph I. Risk assessment of wandering behavior in mild dementia. International Journal of Geriatric Psychiatry. 2016 Apr;31(4):367-74.	1	Outcome was not falls.
Almeida Silva I, Rodrigues Amorim J, Teixeira de Carvalho F, de Andrade Mesquita LS, Pesquisa F e. Effect of a proprioceptive neuromuscular facilitation (PNF) protocol on the postural balance of older women. Fisioterapia e Pesquisa. 2017;24(1):62-67.	2	Study not in English; outcome was not falls.
Anstey K, Von Sanden C, Luszcz M. An 8-year prospective study of the relationship between cognitive performance and falling in very old adults. Journal of the American Geriatrics Society. 2006;54(8):1169-1176.	1	Did not report psychometric properties for the Functional Reach Test.
Ashburn A, Hyndman D, Pickering R, Yardley L, Harris S. Predicting people with stroke at risk of falls. Age and ageing. 2008 May 1;37(3):270-6.	1	Participants were not 60 years of age or older.
Aoyama M, Suzuki Y, Onishi J. Physical and functional factors in activities of daily living that predict falls in community-dwelling older women. Geriatrics & Gerontology International. 2011;11(3):348-357.	1	Did not report psychometric properties for the Functional Reach Test.
Arima K, Abe Y, Nishimura T, Okabe T, Tomita Y, Mizukami S, Kanagae M, Aoyagi K. Association of vertebral compression fractures with physical performance measures among community-dwelling Japanese women aged 40 years and older. BMC Musculoskeletal Disorders. 2017 Dec 1;18(1):176.	3	Not a prospective study; outcome was not falls; did not report psychometric properties for the Functional Reach Test.
Audet M, Hars M, Herrmann F, et al. Functional performances on admission predict elderly patients in-hospital falls. Journal of Bone and Mineral Research. 2017;31.	1	Grey literature (conference abstract).
Ballard J, McFarland C, Wallace L, Holiday D, Roberson G. The effect of 15 weeks of exercise on balance, leg strength, and reduction in falls in 40 women	1	Did not report psychometric properties for the Functional Reach Test.

aged 65 to 89 years. Journal of the American Medical Women's Association. 2004;59(4):255-261.		
Baloh R, Corona S, Jacobson K, Enrietto J. A prospective study of posturography in normal older people. Journal of the American Geriatrics Society. 1998;46(4):438-443.	1	Did not report psychometric properties for the Tinetti gait and balance score.
Barker KL, Newman M, Stallard N, Leal J, Lowe CM, Javaid MK, Noufaily A, Adhikari A, Hughes T, Smith DJ, Gandhi V. Exercise or manual physiotherapy compared with a single session of physiotherapy for osteoporotic vertebral fracture: Three-arm PROVE RCT. Health Technology Assessment. 2019;23(44):1-318.	2	Outcome was not falls; did not report psychometric properties for the Functional Reach Test.
Bartimole L, Fristad M. Taiji (Tai Chi) for fall prevention in the elderly: Training the trainers evaluation project. EXPLORE. 2017;13(3):198-200.	2	Outcome was not falls; did not report psychometric properties for the Functional Reach Test.
Bautmans I, Jansen B, Van Keymolen B. Reliability and clinical correlates of 3D-accelerometry based gait analysis outcomes according to age and fall-risk. Gait Posture. 2011;33(3):366-372.	2	Not a prospective study; did not report psychometric properties for the Tinetti test.
Beaudart C, Buckinx F, Maquet D, Crielaard J, Reginster J. What are the clinical characteristics of patients improving their gait and body balance with whole body vibration? Results of a 3-month randomized controlled trial. European Geriatric Medicine. 2013;4.	4	Outcome was not falls; unable to extract data; grey literature (conference abstract); did not report psychometric properties for the Tinetti test.
Beaudart C. Sarcopenia in community dwelling subjects: The sarcophage study. Osteoporosis International. 2017;28(1 Supplement 1):S124-S125.	5	Did not use either the Tinetti Test, Single Leg Stance Test, or Functional Reach Test; outcome was not falls; unable to extract data; grey literature (conference abstract); no psychometric properties reported.
Beaudart C, Reginster JY, Petermans J, et al. Clinical components linked to sarcopenia: The sarcophage study. Osteoporosis International. 2015;26:S144.	4	Outcome was not falls; unable to extract data; grey literature (conference abstract); did not report psychometric properties for the Tinetti test.
Bhatti D, Thompson R, Xia Y, et al. Comprehensive, blinded assessment of balance in orthostatic tremor. Parkinsonism & Related Disorders. 2018;47:22-25.	3	Not a prospective study; outcome was not falls; did not report psychometric properties for the Functional Reach Test or Single Leg Stance Test.

Bischoff HA, Conzelmann M, Lindemann D, Singer-Lindpaintner L, Stucki G, Vonthein R, Dick W, Theiler R, Stähelin HB. Self-reported exercise before age 40: influence on quantitative skeletal ultrasound and fall risk in the elderly. Archives of Physical Medicine and Rehabilitation. 2001 Jun 1;82(6):801-6.	1	Did not report psychometric properties for the Functional Reach Test.
Bizovska L, Svoboda Z, Vuillerme N, Janura M. Multiscale and Shannon entropies during gait as fall risk predictors-A prospective study. Gait Posture. 2017;52:5-10.	1	Did not report psychometric properties for the Tinetti balance assessment tool.
Boltz M, Resnick B, Capezuti E, Shuluk J, Secic M. Functional Decline in Hospitalized Older Adults: Can Nursing Make a Difference? Geriatr Nurs (Minneap). 2012;33(4):272-279.	2	Outcome was not falls; did not report psychometric properties for the Tinetti gait and balance scale.
Bowen M, Crenshaw J, Stanhope S. Balance ability and cognitive impairment influence sustained walking in an assisted living facility. Arch Gerontol Geriatr. 2018;77:133-141.	3	Not a prospective study; outcome was not falls; did not report psychometric properties for the Tinetti gait and balance test.
Braun T, Rieckmann A, Weber F, Coppers A, Leimer S, Tofaute L, Reinke J, Urner C, Krämer H, Thiel C, Lord S. The De Morton Mobility Index (DEMMI) as a predictive measure of fall risk after inpatient rehabilitation—preliminary results. Physiotherapy. 2015 May 1;101:e488-9.	4	Did not use either the Tinetti Test, Single Leg Stance Test, or Functional Reach Test; outcome was not falls; grey literature (conference abstract); no psychometric properties reported.
Brett L, Stapley P, Meedya S, Traynor V. Effect of physical exercise on physical performance and fall incidents of individuals living with dementia in nursing homes: a randomized controlled trial. Physiother Theory Pract. 2019:1-14.	1	Did not report psychometric properties for the Functional Reach Test.
Brown T, Li X, Jacobson L. Balance confidence predicts falls better than physical function testing in HIV+ men. InConference on Retroviruses and Opportunistic Infections 2015 Feb 23 (pp. 23-26).	3	Unable to extract data; grey literature (conference abstract); did not report psychometric properties for the Functional Reach Test.
Bruyère O, Detalle AS, Demonceau M, Beaudart C, Croisier JL, Crielaard JM, Reginster JY, Maquet D. Quantitative gait assessment using an accelerometer technology as a predictive tool of falls among nursing home residents: a 6-month prospective study. InProceedings of the meeting 2013 Feb 22.	1	Grey literature (conference abstract).
Buatois S, Gueguen R, Gauchard G, Benetos A. Posturography and risk of recurrent falls in healthy non-institutionalized persons aged over 65. Gerontology. 2006;52(6):345-352.	1	Did not report psychometric properties for the Single Leg Stance Test.

Buatois S, Miljkovic D, Manckoundia P, Gueguen R, Miget P, Vançon G, Perrin P, Benetos A. Five times sit to stand test is a predictor of recurrent falls in healthy community-living subjects aged 65 and older. Journal of the American Geriatrics Society. 2008 Aug;56(8):1575-7.	1	Did not report psychometric properties for the Single Leg Stance Test.
Buatois S, Perret-Guillaume C, Gueguen R, Miget P, Vançon G, Perrin P, Benetos A. A simple clinical scale to stratify risk of recurrent falls in community-dwelling adults aged 65 years and older. Physical therapy. 2010 Apr 1;90(4):550-60.	1	Did not report psychometric properties for the Single Leg Stance Test.
Buckinx F, Reginster JY, Brunois T, Lenaerts C, Beaudart C, Croisier JL, Petermans J, Bruyère O. Prevalence of sarcopenia in a population of nursing home residents according to their frailty status: results of the SENIOR cohort. Journal of Musculoskeletal & Neuronal Interactions. 2017 Sep;17(3):209.	2	Outcome was not falls; did not report psychometric properties for the Tinetti gait and balance test.
Buckinx F, Beaudart C, Slomian J, Maquet D, Demonceau M, Gillain S, Petermans J, Reginster JY, Bruyère O. Risk factors for falls among elderly nursing home residents: a 2-year prospective study. Osteoporosis International. 2014;25(2):36-7.	3	Unable to extract data; grey literature (conference abstract); did not report psychometric properties for the Tinetti gait and balance test.
Buckinx F, Croisier JL, Reginster JY, Brunois T, Lenaerts C, Rygaert X, Petermans J, Bruyère O. What are the best 1-year predictors of falls and mortality among nursing home residents? Results of the SENIOR cohort. In13th International Congress of the European Union Geriatric Medicine Society–Developing Preventive Actions in Geriatrics 2017 (Vol. 8, p. 115).	3	Unable to extract data; grey literature (conference abstract); did not report psychometric properties for the Tinetti gait and balance test.
Buckinx F, Beaudart C, Slomian J, Maquet D, Demonceau M, Gillain S, Petermans J, Reginster JY, Bruyère O. Added value of a triaxial accelerometer assessing gait parameters to predict falls and mortality among nursing home residents: a two-year prospective study. Technology and Health Care. 2015 Jan 1;23(2):195-203.	1	Did not report psychometric properties for the Tinetti gait and balance test.
Buckinx F, Beaudart C, Maquet D, Demonceau M, Crielaard JM, Reginster JY, Bruyère O. Evaluation of the impact of 6-month training by whole body vibration on the risk of falls among nursing home residents, observed over a 12-month period: a single blind, randomized controlled trial. Aging Clinical and Experimental Research. 2014 Aug 1;26(4):369-76.	1	Did not report psychometric properties for the Tinetti gait and balance test.

Buckinx F, Reginster JY, Croisier JL, Petermans J, Bruyère O. Physical and muscle performances among elderly nursing home residents. Results of the SENIOR cohort. Journal of Frailty and Aging. 2016;5(Supplement 1):69.	4	Unable to extract data; outcome was not falls; grey literature (conference abstract); did not report psychometric properties for the Tinetti gait and balance test.
Buckinx F, Croisier JL, Reginster JY, Lenaerts C, Brunois T, Rygaert X, Petermans J, Bruyere O. Prediction of the incidence of falls and deaths among elderly nursing home residents: the SENIOR study. Journal of the American Medical Directors Association. 2018 Jan 1;19(1):18-24.	1	Did not report psychometric properties for the Tinetti gait and balance test.
Capon A, Di Lallo D, Mastromattei A, Pavoni N. Incidence and risk factors for accidental falls among general practice elderly patients in Latina, Central Italy. Epidemiol Prev. 2007;31(4):204-211.	2	Study not in English; did not report psychometric properties for the Tinetti gait and balance test.
Celletti C, Fattorini L, Camerota F, Ricciardi D, La Torre G, Landi F, Filippi GM. Focal muscle vibration as a possible intervention to prevent falls in elderly women: a pragmatic randomized controlled trial. Aging clinical and experimental research. 2015 Dec 1;27(6):857-63.	2	Outcome was not falls; did not report psychometric properties for the Tinetti gait and balance test.
Charles A, Buckinx F, Cataldo D, Rygaert X, Gruslin B, Reginster JY, Bruyere O. Relationship between peak expiratory flow and incidence of frailty, deaths and falls among nursing home residents: Results of the SENIOR cohort. Archives of gerontology and geriatrics. 2019 Nov 1;85:103913.	1	Did not report psychometric properties for the Tinetti gait and balance test.
Cho J, Park J, Cho M, Chung S, Kim K. The effects of community based group exercise program in frail older adults: 24 weeks prospective study. PM&R. 2017;9(9 Supplement 1):S143-S144.	3	Outcome was not falls; grey literature (conference poster); did not report psychometric properties for the Functional Reach Test.
Chu LW, Chi I, Chiu AY. Incidence and predictors of falls in the Chinese elderly. Ann Acad Med Singapore. 2005 Jan 1;34(1):60-72.	1	Did not report psychometric properties for the Tinetti gait and balance test.
Chu LW, Chiu AY, Chi I. Impact of falls on the balance, gait, and activities of daily living functioning in community-dwelling Chinese older adults. The Journals of Gerontology Series A: Biological Sciences and Medical Sciences. 2006 Apr 1;61(4):399-404.	1	Did not report psychometric properties for the Tinetti gait and balance test.
Cleary K, Skornyakov E. Predicting falls in older adults using the four square step test. Physiotherapy theory and practice. 2017 Oct 3;33(10):766-71.	2	Not a prospective study; did not report psychometric properties for the Tinetti gait and balance test.

Davis DH, Rockwood MR, Mitnitski AB, Rockwood K. Impairments in mobility and balance in relation to frailty. Archives of gerontology and geriatrics. 2011 Jul 1;53(1):79-83.	3	Not a prospective study; outcome was not falls; did not report psychometric properties for the Functional Reach Test.
Davis JW, Ross PD, Nevitt MC, Wasnich RD. Risk factors for falls and for serious injuries on falling among older Japanese women in Hawaii. Journal of the American Geriatrics Society. 1999 Jul;47(7):792-8.	1	Did not report psychometric properties for the Functional Reach Test.
de Melo GE, de Moura RC, Lopes JB, Junior PR, Lazzari RD, Duarte ND, Junior JR, Dumont AJ, Kleiner AF, Galli M, Ferreira LA. Effects of virtual reality on parkinsonian gait: blind controlled randomized clinical trial protocol. Manual Therapy, Posturology & Rehabilitation Journal. 2017:1-7.	2	Outcome was not falls; did not report psychometric properties for the Tinetti gait and balance test.
Díaz Grávalos GJ, Gil Vázquez C, Andrade Pereira V, Alonso Payo R, Alvarez Araujo S, Reinoso Hermida S. Risk factors for falls amongst older people living in nursing home. A cohort study. Revista Sspanola de Geriatria y Gerontologia. 2009;44(6):301-4.	2	Study not in English; did not report psychometric properties for the Tinetti gait and balance test.
do Rosario JT, da Fonseca Martins NS, Peixinho CC, Oliveira LF. Effects of functional training and calf stretching on risk of falls in older people: A pilot study. Journal of aging and physical activity. 2017 Apr 1;25(2):228-33.	2	Outcome was not falls; did not report psychometric properties for the Functional Reach Test.
Ramdharry GM, Dudziec M, Laura M. Dynamic balance: Relating functional reach tests to falls and impairment. InWorld Congress of Physical Therapy, Cape Town 2017.	3	Unable to extract data; grey literature (conference abstract); did not report psychometric properties for the Functional Reach Test.
Duncan PW, Studenski S, Chandler J, Prescott B. Functional reach: predictive validity in a sample of elderly male veterans. Journal of gerontology. 1992 May 1;47(3):M93-8.	1	Did not report psychometric properties for the Functional Reach Test.
Dyer CA, Taylor GJ, Reed M, Dyer CA, Robertson DR, Harrington R. Falls prevention in residential care homes: A randomised controlled trial. Age and Ageing. 2004 Nov 1;33(6):596-602.	1	Did not report psychometric properties for the Tinetti gait and balance test.
Emilio EJ, Hita-Contreras F, Jiménez-Lara PM, Latorre-Román P, Martínez-Amat A. The association of flexibility, balance, and lumbar strength with balance ability: Risk of falls in older adults. Journal of sports science & medicine. 2014 May;13(2):349.	2	Outcome was not falls; did not report psychometric properties for the Tinetti gait and balance test.

Estrella-Castillo DF, Euán-Paz A, Pinto-Loría ML, Sánchez-Escobedo PA, Rubio-Zapata HA. Alteraciones del equilibrio como predictoras de caídas en una muestra de adultos mayores de Mérida Yucatán, México. Rehabilitación. 2011 Oct 1;45(4):320-6.	2	Study not in English; did not report psychometric properties for the Tinetti gait and balance test.
Formiga F, Ferrer A, Alburquerque J, Fernández-Quevedo M, Royo C, Pujol on behalf of the Octabaix Study Members R. The challenge of maintaining successful aging at 87 years old: The Octabaix study two-year follow-up. Rejuvenation Research. 2012 Dec 1;15(6):584-9.	2	Outcome was not falls; did not report psychometric properties for the Tinetti gait and balance test.
Formiga F, Ferrer A, Chivite D, Montero A, Sanz H, Pujol, on behalf of the Octabaix Study Members R. Utility of geriatric assessment to predict mortality in the oldest old: The Octabaix study 3-year follow-up. Rejuvenation Research. 2013 Aug 1;16(4):279-84.	2	Outcome was not falls; did not report psychometric properties for the Tinetti gait and balance test.
Formiga F, Ferrer A, Padros G, Montero A, Gimenez-Argente C, Corbella X. Evidence of functional declining and global comorbidity measured at baseline proved to be the strongest predictors for long-term death in elderly community residents aged 85 years: A 5-year follow-up evaluation, the OCTABAIX study. Clinical Interventions in Aging. 2016;11:437.	2	Outcome was not falls; did not report psychometric properties for the Tinetti gait and balance test.
Fujimoto A, Hori H, Tamura T, Hirai T, Umemura T, Iguchi F, Sawa S, Ogawa K, Sato K, Kusaka Y. Relationships between estimation errors and falls in healthy aged dwellers. Gerontology. 2015;61(2):109-15.	1	Did not report psychometric properties for the Single Leg Stance Test or Functional Reach Test.
Georgy E, Barsnley S, Chellappa R. Effect of physical exercise-movement strategies programme on mobility, falls, and quality of life in Parkinson's disease. International Journal of Therapy and Rehabilitation. 2012 Feb;19(2):88-96.	1	Did not report psychometric properties for Tinetti falls assessment tool.
Gianoudis J, Bailey CA, Sanders KM, Nowson CA, Hill K, Ebeling PR, Daly RM. Osteo-cise: Strong bones for life: Protocol for a community-based randomised controlled trial of a multi-modal exercise and osteoporosis education program for older adults at risk of falls and fractures. BMC Musculoskeletal Disorders. 2012 Dec 1;13(1):78.	1	Did not report psychometric properties for Functional Reach Test.
Graves M, Snyder K, McFelea J, Szczepanski J, Smith MP, Strobel T, Mehrnia N, Schneider J, Snyder MJ, Graves AK, Canlas J. Quantitative measurement of the improvement derived from a 10-mo progressive exercise program to improve balance and function in women at increased risk for fragility fractures. Journal of Clinical Densitometry. 2020 Apr 1;23(2):286-93.	2	Outcome was not falls; did not report psychometric properties for Functional Reach Test.

Geerse DJ, Roerdink M, Marinus J, van Hilten JJ. Walking adaptability for targeted fall-risk assessments. Gait & posture. 2019 May 1;70:203-10.	1	Did not report psychometric properties for Functional Reach Test.
Grill S. Postural instability in Parkinson's disease. Maryland Medical Journal (Baltimore, Md.: 1985). 1999;48(4):179.	2	Unable to extract data; did not report psychometric properties for Functional Reach.
Grill S, Weuve J, Weisskopf MG. Predicting outcomes in Parkinson's disease: comparison of simple motor performance measures and the unified Parkinson's disease rating scale-III. Journal of Parkinson's disease. 2011 Jan 1;1(3):287-98.	1	Participants were not 60 years of age or older.
Hack J, Buecking B, Aigner R, Oberkircher L, Knauf T, Ruchholtz S, Eschbach D. What are the influencing factors in self-rated health status after hip fracture? A prospective study on 402 patients. Archives of osteoporosis. 2019 Dec 1;14(1):92.	2	Outcome was not falls; did not report psychometric properties for the Tinetti test.
Hageman PA, Thomas VS. Gait performance in dementia: The effects of a 6-week resistance training program in an adult day-care setting. International Journal Of Geriatric Psychiatry. 2002 Apr;17(4):329-34.	2	Outcome was not falls; did not report psychometric properties for the Tinetti-Gait Assessment Scale.
Hernandez M, Mestres C, Junyent J, Modamio P, Fernandez C, Mariño E. Safety related to psychogeriatric patients: One-year prospective study. European Journal of Hospital Pharmacy. 2019 Mar;26: 5PSQ-135.	3	Unable to extract data; grey literature (conference abstract); did not report psychometric properties for the Tinetti test.
Hortobágyi T, Uematsu A, Sanders L, Kliegl R, Tollár J, Moraes R, Granacher U. Beam Walking to Assess Dynamic Balance in Health and Disease: A Protocol for the "BEAM" Multicenter Observational Study. Gerontology. 2019;65(4):332-9.	2	Not a prospective study; did not report psychometric properties for Functional Reach.
Huang TT, Wang WS. Comparison of three established measures of fear of falling in community-dwelling older adults: psychometric testing. International Journal of Nursing Studies. 2009 Oct 1;46(10):1313-9.	2	Outcome was not falls; did not report psychometric properties for Tinetti Mobility Scale.
Kataoka H, Tanaka N, Saeki K, Kiriyama T, Ueno S. Low frontal assessment battery score as a risk factor for falling in patients with Hoehn-Yahr stage III Parkinson's disease: A 2-year prospective study. European Neurology. 2014;71(3-4):187-92.	1	Did not report psychometric properties for the Tinetti gait and balance test.
Kataoka H, Ueno S. Low FAB score as a predictor of future falling in patients with Parkinson's disease: A 2.5-year prospective study. Journal of Neurology. 2015 Sep 1;262(9):2049-55.	1	Did not report psychometric properties for the Tinetti gait and balance test.
Kerber KA, Enrietto JA, Jacobson KM, Baloh RW. Disequilibrium in older people: A prospective study. Neurology. 1998 Aug 1;51(2):574-80.	1	Did not report psychometric properties for Tinetti Gait and Balance Scale.

Kerr GK, Worringham CJ, Cole MH, Lacherez PF, Wood JM, Silburn PA. Predictors of future falls in Parkinson disease. Neurology. 2010 Jul 13;75(2):116-24.	1	Participants were not 60 years of age or older.
Kikuchi R, Kozaki K, Iwata A, Hasegawa H, Toba K. Evaluation of risk of falls in patients at a memory impairment outpatient clinic. Geriatrics & Gerontology International. 2009 Sep;9(3):298-303.	1	Did not report psychometric properties for Functional Reach Test.
Kita K, Hujino K, Nasu T, Kawahara K, Sunami Y, Japanese Clinical Orthopaedic Association. A simple protocol for preventing falls and fractures in elderly individuals with musculoskeletal disease. Osteoporosis International. 2007 May 1;18(5):611-9.	1	Did not report psychometric properties for Single Leg Stance Test.
Knobe M, Giesen M, Plate S, Gradl-Dietsch G, Buecking B, Eschbach D, van Laack W, Pape HC. The Aachen Mobility and Balance Index to measure physiological falls risk: A comparison with the Tinetti POMA Scale. European Journal of Trauma and Emergency Surgery. 2016 Oct 1;42(5):537-45.	1	Outcome was not falls (prospectively).
Krampe J, Rantz MJ, Dowell L, Schamp R, Skubic M, Abbott C. Dance-based therapy in a program of all-inclusive care for the elderly: An integrative approach to decrease fall risk. Nursing Administration Quarterly. 2010 Apr 1;34(2):156-61.	2	Outcome was not falls; did not report psychometric properties for Functional Reach Test.
Manckoundia P, Taroux M, Kubicki A, Mourey F. Impact of ambulatory physiotherapy on motor abilities of elderly subjects with Alzheimer's disease. Geriatrics & Gerontology International. 2014 Jan;14(1):167-75.	1	Did not report psychometric properties for Tinetti and Single Leg Stance Test.
Kuptniratsaikul V, Praditsuwan R, Assantachai P, Ploypetch T, Udompunturak S, Pooliam J. Effectiveness of simple balancing training program in elderly patients with history of frequent falls. Clinical Interventions in Aging. 2011;6:111.	1	Did not report psychometric properties for Functional Reach Test.
Kurz I, Gimmon Y, Shapiro A, Debi R, Snir Y, Melzer I. Unexpected perturbations training improves balance control and voluntary stepping times in older adults-a double blind randomized control trial. BMC geriatrics. 2016 Dec 1;16(1):58.	1	Did not report psychometric properties for Performance-Oriented Mobility Assessment.
Lee K, Lee S, Song C. Whole-body vibration training improves balance, muscle strength and glycosylated hemoglobin in elderly patients with diabetic neuropathy. The Tohoku journal of experimental medicine. 2013;231(4):305-14.	3	Not a prospective study; outcome was not falls; did not report psychometric properties for Single Leg Stance Test and Functional Reach.

Li F, Harmer P, Fitzgerald K, Eckstrom E, Stock R, Galver J, Maddalozzo G, Batya SS. Tai chi and postural stability in patients with Parkinson's disease. New England Journal of Medicine. 2012 Feb 9;366(6):511-9.	1	Did not report psychometric properties for Functional Reach Test.
Li F, Harmer P, Fisher KJ, McAuley E. Tai Chi: improving functional balance and predicting subsequent falls in older persons. Medicine & Science in Sports & Exercise. 2004 Dec 1;36(12):2046-52.	1	Did not report psychometric properties for Functional Reach Test.
Liang CC, Change QX, Hung YC, Chen CC, Lin CH, Wei YC, Chen JC. Effects of a community care station program with structured exercise intervention on physical performance and balance in community-dwelling older adults: A prospective 2-year observational study. Journal of Aging and Physical Activity. 2017 Oct 1;25(4):596-603.	2	Outcome was not falls; did not report psychometric properties for Functional Reach and Single Leg Stance Test.
Lin MR, Hwang HF, Wang YW, Chang SH, Wolf SL. Community-based tai chi and its effect on injurious falls, balance, gait, and fear of falling in older people. Physical Therapy. 2006 Sep 1;86(9):1189-201.	1	Did not report psychometric properties for Tinetti Balance and Gait Scale.
Lin MR, Wolf SL, Hwang HF, Gong SY, Chen CY. A randomized, controlled trial of fall prevention programs and quality of life in older fallers. Journal of the American Geriatrics Society. 2007 Apr;55(4):499-506.	2	Outcome was not falls; did not report psychometric properties for Functional Reach Test and Tinetti Balance and Gait Scale.
Liu TW, Ng SS. Assessing the fall risks of community-dwelling stroke survivors using the Short-form Physiological Profile Assessment (S-PPA). PLoS One. 2019 May 21;14(5):e0216769.	1	Not a prospective study.
Lo C, Arora S, Baig F, Lawton MA, El Mouden C, Barber TR, Ruffmann C, Klein JC, Brown P, Ben-Shlomo Y, de Vos M. Predicting motor, cognitive & functional impairment in Parkinson's. Annals of Clinical and Translational Neurology. 2019 Aug;6(8):1498-509.	3	No test of interest included; outcome was not falls; did not report psychometric properties.
Lundin-Olsson L, Nyberg L, Gustafson Y. Attention, frailty, and falls: The effect of a manual task on basic mobility. Journal of the American Geriatrics Society. 1998 Jun;46(6):758-61.	1	Did not report psychometric properties for Functional Reach Test.
McCurdy C, Popinski J, Rizzo C, Gay J, Billek-Sawhney B. The reliability and validity of the Ruler Reach Test and its relationship to the Functional Reach Test in adults aged 65 and older residing in an assisted living facility. Journal of Geriatric Physical Therapy. 2003;26(3):38-39.	5	Not a prospective study; outcome was not falls; unable to extract data; grey literature (conference abstract); did not report psychometric properties for Functional Reach Test.

McMurdo ME, Millar AM, Daly F. A randomized controlled trial of fall prevention strategies in old peoples' homes. Gerontology. 2000;46(2):83-7.	1	Did not report psychometric properties for Functional Reach Test.
Michel-Pellegrino V, Hewson DJ, Drieux M, Duchêne J. Evaluation of the risk of falling in institution-dwelling elderly: clinical tests versus biomechanical analysis of stepping-up. In2007 29th Annual International Conference of the IEEE Engineering in Medicine and Biology Society 2007 Aug 22 (pp. 6121-6124). IEEE.	1	Did not report psychometric properties for Tinetti Test.
Miller KL, Richter HE, Graybill CS, Neumayer LA. Fall risk and function in older women after gynecologic surgery. Archives of Gerontology and Geriatrics. 2017 Nov 1;73:37-42.	1	Did not report psychometric properties for Tinetti Fall Risk Scale.
Mirolsky-Scala G, Kraemer T. Fall management in Alzheimer-related dementia: A case study. Journal of Geriatric Physical Therapy. 2009 Jan 1;32(4):181-9.	2	Not a prospective study; did not report psychometric properties for Tinetti Assessment Tool.
Montero-Alía P, Miralles-Basseda R, López-Jiménez T, Muñoz-Ortiz L, Jiménez-González M, Prat-Rovira J, Albarrán-Sánchez JL, Manresa-Domínguez JM, Andreu-Concha CM, Rodríguez-Pérez MC, Martí-Cervantes JJ. Controlled trial of balance training using a video game console in community-dwelling older adults. Age and Ageing. 2019 Jul 1;48(4):506-12.	1	Did not report psychometric properties for Tinetti Balance Test.
Mulasso A, Roppolo M, Gobbens RJ, Rabaglietti E. Mobility, balance and frailty in community-dwelling older adults: What is the best 1-year predictor of falls?. Geriatrics & Gerontology International. 2017 Oct;17(10):1463-9.	1	Did not report psychometric properties for Single Leg Stance Test.
Alvarez MN, Rodriguez-Manas L. Recurrent falls in nursing homes. Revista Espanola de Geriatria y Gerontologia. 2006;41(4):201.	3	Study not in English; unable to extract data; did not report psychometric properties for Tinetti Test.
Ni M, Mooney K, Balachandran A, Signorile J. The comparative effects of Tai Chi, balance training and a specially designed yoga balance program on balance performances in older fallers. Journal of the American Geriatrics Society. 2014 Mar 1;62.	2	Outcome was not falls; did not report psychometric properties for One Leg Stance and Functional Reach Test.
Nitz JC, Choy NL, Ogilvie M. The effect of depression on balance decline in mature women. Hong Kong Physiotherapy Journal. 2005 Jan 1;23(1):27-35.	1	Did not report psychometric properties for Functional Reach Test.
Nitz JC, Josephson DL. Enhancing functional balance and mobility among older people living in long-term care facilities. Geriatric Nursing. 2011 Mar 1;32(2):106-13.	1	Did not report psychometric properties for Functional Reach Test.

Nolan M, Power D, Long J. Frailty and its association with rehabilitation outcomes: A prospective cohort study of a post-acute frail older population. Irish Journal of Medical Science. 2014;183(7 SUPPL. 1): S304.	3	Outcome was not falls; grey literature (conference abstract); did not report psychometric properties for the Tinetti test.
Nolan M, Power D, Long J, Horgan F. Frailty and its association with rehabilitation outcomes in a post-acute older setting. International Journal of Therapy and Rehabilitation. 2016 Jan 2;23(1):33-40.	2	Outcome was not falls; did not report psychometric properties for the Tinetti test.
Noohu MM, Dey AB, Hussain ME. Relevance of balance measurement tools and balance training for fall prevention in older adults. Journal of Clinical Gerontology and Geriatrics. 2014 Jun 1;5(2):31-5.	2	Not a research article (review); unable to extract data.
Ojo F, Edwards BJ. Frequency of low bone mass in elderly males attending an academic geriatric clinic: A pilot study. The Aging Male. 2003 Jan 1;6(3):145-50.	2	Outcome was not falls; did not report psychometric properties for the Tinetti test.
Olson SL, Chen SS, Wang CY. Effect of a home exercise program on dynamic balance in elderly with a history of falls. Journal of Aging and Physical Activity. 2011 Oct 1;19(4):291-305.	2	Outcome was not falls; did not report psychometric properties for the Functional Reach Test.
Ozaki K, Kagaya H, Hirano S, Kondo I, Tanabe S, Itoh N, Saitoh E, Fuwa T, Murakami R. Preliminary trial of postural strategy training using a personal transport assistance robot for patients with central nervous system disorder. Archives of Physical Medicine and Rehabilitation. 2013 Jan 1;94(1):59-66.	2	Outcome was not falls; did not report psychometric properties for the Functional Reach Test.
Pais SR, Palma M, Roque A, Marreiros A. Physical activity can influence pain intensity in community living elderly subjects with osteoarthritis. Osteoarthritis and Cartilage. 2018 Apr 1;26:S116.	2	Outcome was not falls; did not report psychometric properties for the Tinetti test.
Pardasaney PK, Latham NK, Jette AM, Wagenaar RC, Ni P, Slavin MD, Bean JF. Sensitivity to change and responsiveness of four balance measures for community-dwelling older adults. Physical Therapy. 2012 Mar 1;92(3):388-97.	3	Not a prospective study: cross-sectional; outcome was not falls; did not report psychometric properties for the Tinetti test.
Park J, Koh SB, Kim HJ, Oh E, Kim JS, Yun JY, Kwon DY, Kim Y, Kim JS, Kwon KY, Park JH. Validity and reliability study of the Korean Tinetti Mobility Test for Parkinson's disease. Journal of movement disorders. 2018 Jan;11(1):24.	2	No prospective study; outcome was not falls
Pavon J, Sloane R, Hastings S. Functional measures predict discharge destination but not readmissions. Journal of the American Geriatrics Society. 2015;63(SUPPL. 1):S131.	5	Not a prospective study; outcome was not falls; unable to extract data; grey literature (conference abstract); did not report psychometric properties for the Tinetti test.
Peláez VC, Ausín L, Mambrilla MR, Gonzalez-Sagrado M, Castrillón JL. Prospective observational study to evaluate risk factors for falls in	1	Did not report psychometric properties for the Tinetti test.

institutionalized elderly people: the role of cystatin C. Aging Clinical and Experimental Research. 2015 Aug 1;27(4):419-24.		
Pérez-Ros P, Martínez-Arnau FM, Orti-Lucas RM, Tarazona-Santabalbina FJ. A predictive model of isolated and recurrent falls in functionally independent community-dwelling older adults. Brazilian journal of physical therapy. 2019 Jan 1;23(1):19-26.	1	Did not report psychometric properties for the Tinetti test.
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Soyuer F, Mirza M, Erkorkmaz Ü. Balance performance in three forms of multiple sclerosis. Neurological Research. 2006 Jul 1;28(5):555-62.	3	Not a prospective study; outcome was not falls; did not report psychometric properties for the Functional Reach Test, Single Leg Stance Test and Tinetti tests.
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Tan M, Nitz J, Boughen J, Fu S. Centre of gravity position in bipedal steady-stance is associated with performance of timed up and go but not functional reach. Physiotherapy. 2015 May 1;101:e1485.	4	Not a prospective study; outcome was not falls; grey literature (conference abstract); did not report psychometric properties for the Functional Reach Test.
Terroba C, Bruno V, Rossi M. Fear of falling in Huntington's disease. Movement Disorders. 2018;33(Supplement 1):S77.	3	Outcome was not falls; grey literature (conference abstract); did not report psychometric properties for the Tinetti test.
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Van Der Velde N, Stricker B, Pols H. Withdrawal of fall-risk-increasing drugs in older persons: Effect on mobility test outcomes. Drugs and Aging. 2007;24(8):691-699.	1	Did not report psychometric properties for the Functional Reach Test.
Vassallo M, Stockdale R, Sharma JC, Briggs R, Allen S. A comparative study of the use of four fall risk assessment tools on acute medical wards. Journal of the American Geriatrics Society. 2005 Jun;53(6):1034-8.	1	Did not use the Tinetti, Single Leg Stance or Functional Reach Test.
Verreckt E, Agrigoroaei S, De Saint Hubert M. Which specific executive functions are predictors of functional decline in community-dwelling older adults? European Geriatric Medicine. 2017;8(Supplement 1):S245.	3	Outcome was not falls; grey literature (conference abstract); did not report psychometric properties for the Tinetti test.
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Weiner DK, Bongiorni DR, Studenski SA, Duncan PW, Kochersberger GG. Does functional reach improve with rehabilitation? Archives of physical medicine and rehabilitation. 1993 Aug 1;74(8):796-800.	2	Outcome was not falls; did not report psychometric properties for the Functional Reach Test.
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Wiles CM, Busse ME, Sampson CM, Rogers MT, Fenton-May J, van Deursen R. Falls and stumbles in myotonic dystrophy. Journal of Neurology, Neurosurgery & Psychiatry. 2006 Mar 1;77(3):393-6.	1	Did not report psychometric properties for the Tinetti test.
Wong-Yu IS, Mak MK. Task-and context-specific balance training program enhances dynamic balance and functional performance in parkinsonian nonfallers: A randomized controlled trial with six-month follow-up. Archives of Physical Medicine and Rehabilitation. 2015 Dec 1;96(12):2103-11.	1	Did not report psychometric properties for the Functional Reach Test and Single Leg Stance Test.
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Yamada M, Uemura K, Mori S, Nagai K, Uehara T, Arai H, Aoyama T. Faster decline of physical performance in older adults with higher levels of baseline locomotive function. Geriatrics & Gerontology International. 2012 Apr;12(2):238-46.	1	Did not report psychometric properties for the Functional Reach Test and Single Leg Stance Test.
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Yamaji S, Demura S. Reliability and fall experience discrimination of cross step moving on four spots test in the elderly. Archives of Physical Medicine and Rehabilitation. 2013 Jul 1;94(7):1312-9.	3	Not a prospective study; outcome was not falls; did not report psychometric properties for the Functional Reach Test and Single Leg Stance Test.