Featured Falls Research – July

The Telephysiotherapy for Older People (TOP-UP) program for improving mobility in people receiving aged care: a hybrid type 1 effectiveness-implementation randomised controlled trial

Dawson R, Pinheiro M, Oliveira J, Haynes A, Naganathan V, Taylor ME, Bowes N, Nelson K, Rayner J, Sherrington C. Med J Aust. 2025 Jul 20. doi: 10.5694/mja2.70004.

DOI: 10.5694/mja2.70004 **PMID:** 40685450

Abstract

Objectives: To assess the effectiveness and implementation of a telephysiotherapy program for improving mobility, mobility goal attainment, and quality of life of people receiving at-home or residential aged care.

Study design: Hybrid type 1 effectiveness-implementation randomised controlled trial.

Setting, participants: People aged 65 years or older who were receiving community or residential aged care services in Australia, 1 September 2021 - 30 November 2023.

Intervention: Telephysiotherapy for Older People (TOP-UP): six-month program of ten telephysiotherapy (Zoom) sessions for assessment and tailored exercise prescription, supported by trained aged care workers and exercise videos.

Main outcome measures: Primary outcome: mobility (Short Physical Performance Battery [SPBB] score at baseline and six months).

Secondary outcomes: fall rate (per person), proportion of people with falls, SPBB components (sit-to-stand performance, balance, gait speed), pain (visual analogue scale), mobility goal attainment, physical activity (Incidental and Planned Exercise Questionnaire), quality of life (EQ-5D-5L visual analogue scale).

Results: A total of 1348 people were screened at 27 sites, and 242 eligible people were recruited for the trial (mean age, 83 years [standard deviation, 8 years]; 158 women [65%]); 92 of 120 intervention group participants and 100 of 122 control group participants completed the six-month. After adjusting for baseline mobility scores, the mean difference in mobility score at six months (intervention v control group) was 2.1 (95% confidence interval [CI], 1.4-2.7) points. Sit-to-stand performance was more likely to improve in intervention than control participants (adjusted odds ratio, 2.7; 95% CI, 1.3-4.3); intervention participants reported greater quality of life (EQ-5D-5L visual analogue scale: adjusted mean difference, 6.2 [95% CI, 1.8-10.7] points) and less pain (visual analogue scale: adjusted mean difference, -1.1 [95% CI, -1.8 to -0.3] points), and a smaller proportion experienced falls (29, 32% v 44, 44%; risk ratio, 0.62; 95% CI, 0.42-0.92). Of 1348 screened people, 242 enrolled in the trial (18.0%), of whom 186 (77%) completed the trial, and 62 of 66 surveyed participants (94%) endorsed the intervention. No serious adverse events were recorded.

Conclusion: The TOP-UP program safely improved mobility, reduced fall risk and pain, and improved quality of life for people receiving aged care. Telephysiotherapy could be incorporated into aged care to improve the lives of older Australians.

Trial registration: Australian New Zealand Clinical Trials Registry, ACTRN 12621000734864 (prospective).

Keywords: Aging; Falls; Health services for the aged; Physiotherapy; Telemedicine.

Risk Factors for Falls in Community-Dwelling Older Adults: An Umbrella Review

Saunders S, D'Amore C, Hao Q, El-Moneim NA, Richardson J, Kuspinar A, Beauchamp M. J Am Med Dir Assoc. 2025 Jul 26;26(9):105765.

DOI: 10.1016/j.jamda.2025.105765 **PMID:** 40651502

Abstract

Objectives: Falls are a key public health concern, resulting in disability and increased mortality risk. An extensive body of literature has examined risk factors for falls; however, results vary across different studies and populations. We aimed to synthesize systematic reviews of fall risk factors in community-dwelling older adults.

Design: A systematic review of systematic reviews. Searches were executed in 6 databases (MEDLINE, Embase, CINAHL, Cochrane Library, PsychINFO, and AgeLine) from inception until June 13, 2023.

Setting and participants: Eligible studies included systematic reviews of prospective cohort studies that included a population of community-dwelling older adults (≥60 years of age) and reported fall risk factors.

Methods: Three reviewers screened 8173 records. Summary data were extracted, and the units of analyses were the relationships between risk factors and falls. Descriptive results are reported in counts and frequencies.

Results: Fifty-seven reviews were included examining 29 risk factors. Mobility-related measures (balance, gait, physical function, physical activity, dual task ability, strength, and range of motion) accounted for 40% of all relationships. Clinical tests of balance and physical function, cognition, specifically executive function (76% significant) and processing speed (100%), medications (58%), frailty (100%), and chronic conditions (83%) were all consistent predictors of falls. There was a paucity of evidence for psychosocial, environmental, and sociodemographic factors. Most reviews (54%) were rated as low risk of bias.

Conclusions and implications: Mobility-related risk factors for falls are well established and can be addressed through interventions. Findings highlight the limited examination of psychosocial, sociodemographic, and environmental risk factors for falls, indicating areas for future research.

Keywords: Review of reviews; community-dwelling; falls; older adults; risk factors.

Falls Research – July

Global Cognition and Inhibition as Predictors of Dynamic Balance in Aging Populations: A Cross-Sectional Study

Divandari N, Bird ML, Zoghi M, Vakili F, Jaberzadeh S. J Clin Med. 2025 Jul 4;14(13):4754.

DOI: 10.3390/jcm14134754 **PMID:** 40649127 **PMCID:** PMC12251477

Abstract

Objectives: To identify cognitive domains predictive of dynamic balance performance in older adults and inform targeted cognitive-motor interventions aimed at improving balance and reducing fall risk.

Methods: This cross-sectional study used hierarchical multiple regression to analyze relationships between cognitive domains and dynamic balance among 62 community-dwelling older adults (≥65 years). Balance was assessed using the Y Balance Test (YBT) and Timed Up and Go Test (TUG), while cognitive function was measured using the Mini-Mental State Examination (global cognition), Stroop Test (inhibition), N-back Test (working memory), and Deary-Liewald Reaction Time Test (processing speed). Statistical analyses were conducted using SPSS, version 28, with significance set at $p < 0.05$.

Results: Although all cognitive domains correlated with dynamic balance, regression analyses indicated that only global cognition and inhibition were significant predictors. Specifically, global cognition significantly predicted both TUG and YBT performance, whereas inhibition uniquely predicted YBT performance (all $p < 0.05$).

Conclusions: Our findings suggest global cognition and inhibition are key cognitive predictors of dynamic balance in older adults. Assessing these domains could identify individuals at risk of impaired balance, facilitating the design of targeted, personalized cognitive-motor interventions. Future research should investigate cognitively enriched exercise programs, including digital therapeutics and wearable technologies, to effectively target these cognitive domains, enhance balance outcomes, and promote sustained physical activity adherence in aging populations.

Keywords: Timed Up and Go test; Y Balance Test; aging; cognitive domains; cognitive training; dual-task interventions; dynamic balance; executive function; exercise interventions; fall prevention.

The Efficiency of Insoles on Quality of Life, Functional Balance and Mobility in Elderly People

Eftekhari S, Aboutorabi A, Zandieh Z, Ershadi FS, Veiskarami M. Musculoskeletal Care. 2025 Sep;23(3):e70149.

DOI: 10.1002/msc.70149 **PMID:** 40635176

Abstract

Objective: Ageing leads to declines in physiological function, impairing mobility, and increasing the risk of falls. Muscle atrophy, particularly in the intrinsic foot muscles, exacerbates these issues. This study evaluates the effects of two types of insoles on balance, mobility, and quality of life in older adults.

Methods: A controlled clinical trial was conducted with 30 participants aged 60 and older assigned to either a thin rigid heel cup insole (TRHI) or a toe-grip insole (TGI). Primary outcomes, including balance, mobility, and quality of life, were assessed using the Berg Balance Scale, Timed Up and Go (TUG) test, and the SF-36 questionnaire, at baseline and after one month of use.

Results: Both groups were comparable at baseline ($p > 0.05$). Significant improvements were observed in the TGI group regarding quality of life, functional balance, and mobility ($p < 0.05$), with pain reductions ($p < 0.001$). While both groups showed within-group improvements, the TGI group demonstrated superior mobility ($p < 0.05$).

Conclusion: Both types of insoles improved balance, mobility, and pain in the elderly, with greater benefits for mobility was shown in TGI group. These findings suggest that insoles can effectively enhance balance, reduce fall risk, and improve quality of life and functional independence in elderly individuals.

Keywords: balance; elderly; fall risk; insole; mobility; quality of life.

Association of multidimensional frailty and dynapenia with fall risk in older adults

Ghorbanzadeh M, Bakhtiari A, Hajian-Tilaki K, Abbaszadeh-Amirdehi M. BMC Geriatr. 2025 Jul 2;25(1):442.

DOI: 10.1186/s12877-025-06097-z **PMID:** 40604510 **PMCID:** PMC12219132

Abstract

Background: Dynapenia and frailty are known to be strong predictors of decreased function and increased mortality in the older adults. However, limited research on the co-occurrence of these factors and the different frailty domains makes their relationship with fall risk poorly understood. The aim of this study was to investigate the relationship between fall risk, dynapenia phenotypes, and frailty domains in the older adults.

Methods: In this cross-sectional study of 400 outpatients aged 65+, without major functional, cognitive, or serious comorbid issues, fall risk was assessed using the Berg Balance Scale. Frailty was evaluated via the TFI across physical, psychological, and social domains. Handgrip dynamometry determined dynapenia, classifying the participants into robust, dynapenic, abdominally obese, and dynapenic-obese phenotypes. To examine the associations between frailty, dynapenia, and fall risk, we applied a comprehensive, multi-layered analytical strategy covering all plausible combinations. Associations were analyzed using univariate and multivariate regressions in SPSS v23.

Results: In univariate analyses, fall risk was markedly higher among older adults with dynapenia (59.2%) or multidimensional frailty (60%), and peaked when both conditions coexisted (67.9%). Multivariate models demonstrated that dynapenia (OR = 2.75; 95% CI: 1.48-5.12) and frailty (OR = 2.56; 95% CI: 1.39-4.70) were independently associated with increased fall risk, with a pronounced effect when both were present (OR = 20.45; 95% CI: 6.02-46.69). Among frailty components, only physical (OR = 1.39; 95% CI: 1.19-1.62) and social frailty (OR = 1.38; 95% CI: 1.03-1.84) remained significant predictors in adjusted analyses. Interaction effects revealed that combining dynapenia with these domains further heightened the risk. A clear dose-response pattern emerged: fall risk escalated from 3.24-fold (95% CI: 1.48-3.09) with two frailty domains plus dynapenia, to 7.27-fold (95% CI: 3.46-7.29) when all three domains co-occurred.

Conclusion: Dynapenia and frailty, particularly in physical and social domains, independently and jointly elevate fall risk in older adults. Their co-occurrence demonstrates a dose-dependent effect, underscoring the need for integrated assessments to better identify and manage those at highest risk.

Keywords: Dynapenia; Dynapenic obesity; Fall risk; Frailty; Physical frailty; Psychological frailty; Social frailty.

Sensorimotor dysfunction and postural instability in older adults with type 2 diabetes mellitus: the role of proprioception and neuropathy

Kardm SM, Kardm AS, Alanazi ZA, Alnakhli HH, Alkhamis BA, Reddy RS. Front Aging Neurosci. 2025 Jun 23;17:1615399.

DOI: 10.3389/fnagi.2025.1615399 **PMID:** 40625373 **PMCID:** PMC12230001

Abstract

Background: Type 2 diabetes mellitus (T2DM) is associated with proprioceptive impairment and postural instability, contributing to increased fall risk. The role of glycemic status and peripheral neuropathy in these deficits remains under-characterized using objective measurement tools.

Objectives: To compare ankle joint proprioception and postural stability between individuals with T2DM and healthy controls using dual inclinometry and computerized posturography, and to examine the relationship between these impairments and glycemic control (HbA1c). Additionally, to evaluate the impact of peripheral neuropathy on sensorimotor function.

Methods: A cross-sectional study included 66 individuals with T2DM and 66 age- and sex-matched healthy controls. Ankle joint proprioception was assessed using dual digital inclinometers, which quantify joint position sense errors during dorsiflexion and plantarflexion. Postural stability was evaluated via posturography under eyes-closed conditions, measuring sway area, velocity, and center of pressure (CoP) displacement.

Results: Participants with T2DM showed significantly greater proprioceptive errors in dorsiflexion (mean difference = 1.93°, 95% CI: 1.61-2.26, d = 2.06) and plantarflexion (mean difference = 2.50°, 95% CI: 2.08-2.92, d = 2.03) compared to controls. Postural sway area and velocity were also higher (sway area mean difference = 62.76 cm^2, 95% CI: 47.44-78.07, d = 1.40). HbA1c levels were moderately correlated with proprioception errors ($r \approx 0.54$) and postural instability ($r \approx 0.65$). Participants with peripheral neuropathy demonstrated significantly worse proprioception and balance. Regression models showed HbA1c and diabetes duration were significantly associated with proprioceptive and postural impairments (adjusted R^2: 0.29-0.48 for both domains).

Conclusion: Individuals with T2DM, particularly those with poor glycemic control or peripheral neuropathy, show greater sensorimotor deficits. These findings support early proprioceptive screening and balance interventions to reduce fall risk in diabetic populations. All associations should be interpreted within the limitations of a cross-sectional design.

Keywords: glycemic control; peripheral neuropathy; postural stability; posturography; proprioception; type 2 diabetes mellitus.

Effects of aerobic exercise in addition to core stabilization exercises on functional capacity, physical performance and fall risk in geriatric individuals with chronic non-specific low back pain

Kuzu Ş, Canli M, Valamur İ, Özüdoğru A, Alkan H, Hartavi A. BMC Sports Sci Med Rehabil. 2025 Jul 29;17(1):218.

DOI: 10.1186/s13102-025-01271-7 **PMID:** 40734175 **PMCID:** PMC12308917

Abstract

Background: Geriatric individuals may frequently develop low back pain after physiological changes. The aim of our study was to compare the effects of core stabilization exercises alone and aerobic exercises in addition to core stabilization exercises on functional capacity, physical performance and fall risk in geriatric individuals with chronic non-specific low back pain (CNLBP).

Methods: In this randomized controlled study, 30 participants in the core stabilization exercise group (CG) received intervention, and the mean age of this group was 70.43 ± 4.48 years. The mean age of the 30 participants in the core stabilization + aerobic exercise group (CAG) was determined as 69.60 ± 4.05 years. Sixty individuals with CNLBP were included in the study and divided into two groups: CG (n = 30) and CAG (n = 30). CG received core stabilization exercises for 8 weeks, while CAG received aerobic exercise using a treadmill in addition to core stabilization exercises for 8 weeks. Functional capacity (six-minute walk test), physical performance (Oswestry Disability Index), fall risk (Biodex Balance System), pain intensity (Visual Analogue Scale), depression status (Beck Depression Inventory) and kinesiophobia level (Tampa Kinesiophobia Scale) were evaluated before and after the treatment programmes.

Results: Significant improvements were found in all parameters in both groups after the treatment programmes ($p < 0.05$). In addition, functional capacity, physical performance, fall risk, pain severity and depression scores improved more in CAG compared to CG ($p < 0.05$), but the improvement in kinesiophobia was similar ($p > 0.05$).

Conclusions: The results of the study showed that both core stabilization exercises alone and core stabilization exercises combined with aerobic exercise led to improvements in patients with CNLBP. However, the group that combined aerobic and core stabilization exercises (CAG) showed greater improvements, particularly in functional capacity, physical performance, fall risk, pain intensity, and depression levels. These findings suggest that core stabilization exercises are beneficial for CNLBP, but adding aerobic exercise may enhance these positive effects. Therefore, incorporating aerobic exercise into rehabilitation programmes for older adults with CNLBP may provide additional clinical benefits.

Trial registration: This clinical trial was registered at http://clinicaltrials.gov (Number: NCT06946758; registration date: 21/04/2025).

Keywords: Falls; Functional capacity; Geriatric; Low back pain; Physical performance.

Balance training improves postural control and performance-related prefrontal brain activation in healthy older adults: Results of a six-month randomized controlled training intervention

Lehmann N, Kuhn YA, Keller M, Aye N, Herold F, Draganski B, Taube W, Taubert M. Neurobiol Aging. 2025 Jul 2;154:71-83.

DOI: 10.1016/j.neurobiolaging.2025.07.001 **PMID:** 40618484

Abstract

Age-related deterioration in postural control is an important factor decreasing quality of life. Functional neuroimaging studies have shown that the activation of the prefrontal cortex (PFC) during balancing is typically higher in older (OA) compared to younger adults (YA), probably reflecting a mechanism contributing to worsened balance control with aging. Here, we hypothesized that balance training (BAL) shifts PFC activation towards a more efficient pattern, enabling improved balance performance. To test this hypothesis, we conducted a randomized controlled trial with healthy older (65-80 y) and young adults (18-35 y) of both sexes (n = 63) comparing the effects of a 6-month BAL intervention (1 h of BAL twice weekly) against age-matched, non-BAL controls (CON). In both age groups, we found that BAL led to a significant reduction in sway in trained and untrained balance tasks compared to CON, which could still be observed 6 months after the end of training (multivariate p's < .003). In OA, we found a larger reduction in PFC activation assessed with functional near-infrared spectroscopy in BAL compared to CON after training (multivariate p < .02), and a similar yet not significant trend was observed in YA (p < .06). Importantly, in OA, both cross-sectional correlations and longitudinal correlated changes showed that reduced PFC activation was associated with better balance performance. Our results support the idea that BAL may reduce dysfunctional PFC activation in OA, resulting in activation patterns more similar to those of YA, with positive effects on postural control and possibly fall risk.

Keywords: Aging; Balance; Functional near-infrared spectroscopy (fNIRS); Functional plasticity; Postural control; Prefrontal cortex.

Development and validation of a nomogram for predicting fall risk in frail and prefrail older adults

Li Y, Tang K, Yao J, Zhao H, Liu Y, Deng S, Yin R, Tan M, Zhou C. Geriatr Nurs. 2025 Jul 7;65:103526.

DOI: 10.1016/j.gerinurse.2025.103526 **PMID:** 40633236

Abstract

Introduction: The objective of this study was to develop a fall risk prediction model for frail and prefrail older adults.

Methods: This study used a prospective study design in which 372 frail and prefrail older adults were selected through convenience sampling between September 2023 and February 2024. Multivariate binary logistic regression was used to estimate risk factors for falls in frail and prefrail older adults, and the nomogram prediction model was developed and verified.

Results: Impaired vision, experience of falling, lower level of independence, and poorer postural balance were risk factors for falls in frail and prefrail older adults. Using a walking aid was a protective factor. The area under the curve (AUC) of the nomogram model was 0.911.

Conclusions: The fall risk prediction model developed has good accuracy and provides a basis for early assessment and effective prevention of falls in frail and prefrail older adults.

Keywords: Aging; Fall risk; Nomogram; Prediction model.

The Impact of Finger Exercise on Falls, Balance, Gait, Quality of Life, and Depressive Symptoms Among Community-dwelling Older Adults: A Randomized Controlled Trial

Liao S, Feng R, He Y, Luo B, Li Y, Xiong S, Chen X, Xiong A, Huang Y, Liu J. J Gerontol A Biol Sci Med Sci. 2025 Jul 28:glaf170.

DOI: 10.1093/gerona/glaf170 **PMID:** 40720218

Abstract

Background: Finger exercise, a practice involving specific, coordinated finger and hand movements designed to stimulate acupoints, meridians, and jing-well points, offers a promising non-pharmacological strategy for health management in aging populations. However, its broader health benefits and underlying mechanisms remain underexplored. We aimed to evaluate the effects of finger exercise on falls, balance, gait, quality of life, and depressive symptoms in older adults.

Methods: In this randomized controlled trial, a total of 284 participants were randomized to an intervention group (n = 142), performing 20-minute finger exercise sessions twice daily for two months, or a control group (n = 142) receiving no intervention. Primary outcomes included falls (tracked weekly), balance, and gait (assessed by POMA). Secondary outcomes included quality of life (WHOQOL-BREF), depressive symptoms (PHQ-9), and salivary biomarkers. Group differences were analyzed using Zero-inflated Poisson regression for fall counts, ordinal logistic regression for the percentage of fallers, and linear regression for continuous variables.

Results: Among 276 completers (140 intervention; 136 control), the intervention group had fewer falls (25 vs.63 events), better balance (mean±SD: 13.4 ± 1.9vs.12.5 ± 2.3), gait (10.5 ± 2.5vs.9.6 ± 3.0), higher physical (52.3 ± 9.0vs.48.0 ± 8.0), psychological (57.5 ± 8.5vs.53.1 ± 8.4), and social (60.2 ± 11.5vs.46.1 ± 9.9) quality of life scores, fewer depressive symptoms (3.4 ± 1.8vs.4.6 ± 1.7), and higher BDNF levels (5.5 ± 1.9vs.4.3 ± 1.8), with all differences statistically significant ($P < 0.001$).

Conclusions: Finger exercise showed potential to reduce fall risk and improve quality of life and depressive symptoms, possibly by altering physiological markers such as BDNF levels. Further research is needed to confirm these findings, explore underlying mechanisms, and assess long-term impacts of this intervention in diverse older populations.

Trial registration: chictr.org.cn ChiCTR2300071223.

Keywords: Clinical Trials; Depression; Falls; Successful Aging.

Effectiveness of Shoes With Non-Slip Insole on Balance, Fear of Falling, and Fall Prevention Among Older Women: A Parallel RCT

Norouzi S, Błachnio A, Zeynalzadeh Ghoochani B, Asadollahi A, Kaveh MH. Sage Open Aging. 2025 Jul 20;11:30495334251358528.

DOI: 10.1177/30495334251358528 **PMID:** 40697361 **PMCID:** PMC12280544

Abstract

Background: Wearing inappropriate shoes is one of the external factors that can lead to falling, which is a significant problem for older adults. Therefore, it is crucial to consider anti-slip soles when selecting footwear to maintain balance and reduce the risk of falls.

Methods: In this study, 32 aged women from Farzanegan Daily Caring Foundation in Shiraz, Southern Iran, were selected. The subjects completed demographic, FoF, BBS, and TUG scales. They were divided into four groups and each group was assigned one sole and one group was selected as control. After 3 months, the soles were evaluated.

Results: The results of balance tests and comparison before and after intervention showed a significant difference between anti-slip soles and normal soles ($p \leq .05$). The anti-slip soles had a significant impact on maintaining balance, reducing the frequency of falls, decreasing the fear of falling, and improving the walking ability of older adults.

Conclusions: It is recommended that older individuals use shoes with non-slip soles instead of normal soles to decrease the risk of balance loss and ultimately reduce the frequency of falls.

Keywords: Berg Balance Scale; balance; fall; fear of falling; non-slip insole; older people

Effects of unstable resistance training combined with high-definition transcranial direct current stimulation on proprioception, balance and fall risks in the elderly: a randomized controlled trial study

Peng D, Zhang S, Zhang Y, Wu H, Zou X, Zhang G, Ma Y, Ma T, Wang L. Exp Gerontol. 2025 Jul 22:112843.

DOI: 10.1016/j.exger.2025.112843 **PMID:** 40706715

Abstract

Objective: This study examined the combined effects of unstable resistance training (URT) and high-definition transcranial direct current stimulation on proprioception, balance, and fall risk in community-dwelling older adults, targeting both central neural drive and peripheral neuromuscular adaptations.

Method: Ninety older adults (mean age 66.2 ± 3.3 years) were recruited and randomly assigned to five groups: (1) URT + a-tDCS, (2) URT + s-tDCS, (3) URT, (4) stable resistance training (SRT) and (5) a health education control group (HALE). All participants underwent an 8-week intervention (three sessions per week, 30 min per session). Participants in the URT + a-tDCS group received 2 mA stimulation for 20 min concurrently with URT sessions. Assessments of ankle proprioception, balance and fall risk were conducted at baseline and post-intervention.

Result: Eight weeks of URT + a-tDCS significantly improved proprioception at dorsiflexion and plantarflexion, compared with URT + s-tDCS, URT, SRT and baseline ($P < 0.05$). URT + s-tDCS and URT enhanced proprioception at plantarflexion than baseline ($P = 0.033$; $P = 0.021$). Balance measurements (i.e. COP displacement, COP ellipse area and sway velocity index) under stable and unstable surfaces were significantly improved after URT + a-tDCS, compared with other three training modalities and baseline. The fall-risk declined significantly after URT + a-tDCS compared with HALE and baseline ($P < 0.05$). The change in sway velocity index was positively related to the change in proprioception at plantarflexion after 8-week URT intervention ($R^2 = 0.378$, P = D0.015).

Conclusion: The combined URT and a-tDCS intervention demonstrated synergistic effects, producing statistically significant improvements in proprioceptive acuity and balance parameters among older adults. This integrated intervention offers a promising approach to fall prevention and highlights the importance of targeting both central and peripheral mechanisms in rehabilitation strategies.

Keywords: Balance; Fall-risk; Older adult; Proprioception; Transcranial direct current stimulation; Unstable resistance training.

Assessment of Static Balance Metrics in Community-Dwelling Older Adults Categorized Using the Fall Risk Appraisal Matrix

Suarez JRM, Park JH, Thiamwong L. Int J Environ Res Public Health. 2025 Jul 6;22(7):1079.

DOI: 10.3390/ijerph22071079 **PMID:** 40724146 **PMCID:** PMC12294446

Abstract

The Fall Risk Appraisal Matrix (FRAM) is a simple fall risk assessment tool that categorizes older adults into four separate groups based on their fear of falling (FOF) and static balance performance. Static balance for the FRAM is evaluated solely by postural sway distance, which does not account for other static balance parameters, such as sway area, anterior-posterior (AP) sway range, medial-lateral (ML) sway range, and sway velocity. The objective of this study was to compare these additional metrics across the FRAM groups to assess their relevance and validity for inclusion in static balance performance assessment. Hence, these measures were compared among the four different fall risk groups within the FRAM (203 participants; mean age = 75.0 ± 7.2 years) using Kruskal-Wallis test, followed by Dunn's post hoc tests with Bonferroni correction. All balance metrics were significantly greater in the Incongruent (poor balance/low FOF) and Congruent (poor balance/high FOF) groups than the Rational (good balance/low FOF) group, as well as in the Congruent group than the Irrational (good balance/high FOF) group ($p < 0.001$). Additionally, AP sway range and sway velocity significantly differed between the Irrational and Incongruent groups ($p < 0.001$). The results suggest that the inclusion of these additional static balance measures, in addition to sway distance, reveals specific tendencies in static balance among different fall risk groups, which can serve as a reference for other researchers and future studies to develop more individually tailored intervention programs based on their static balance specificities.

Keywords: BTrackS; directional sway; fear of falling; sway area.

Validation of the German falls risk questionnaire, fall risk check (FRC), in community-dwelling seniors : A diagnostic accuracy study

Thiem U, Schlumbohm I, Otte S, Golgert S, Dapp U. Z Gerontol Geriatr. 2025 Jul 25.

DOI: 10.1007/s00391-025-02462-0 **PMID:** 40711588

Abstract

Background: Falls are a significant health problem for seniors, often indicating increasing mobility impairment and risk of injury. Although necessary for the identification of seniors at risk, only few validated German questionnaires on falls risk exist.

Objective: To validate the German Fall Risk Check (FRC) in independently living, community-dwelling older people against objective measurement of standing and walking balance as assessed by the Short Physical Performance Battery (SPPB).

Material and methods: In a larger randomized controlled trial, evaluating home emergency call systems, we recruited 190 seniors in Hamburg, Germany, to fill in the FRC and pass a comprehensive geriatric assessment. The performance of FRC as a diagnostic test is described by typical measures, such as sensitivity (SN), specificity (SP), predictive values, positive/negative likelihood ratios (LR+/LR-), and area under the curve (AUC) in receiver operator characteristic (ROC) curve analysis, each with corresponding 95% confidence intervals (CI).

Results: In total, 190 seniors with an average age 80.5 years (± 5.5 years), 75.3% women could be analyzed. The sample showed advanced comorbidity and concerns about falling in about one third, and mobility and cognitive impairment in about one half. We calculated: SN 0.679 (95% CI 0.571-0.771); SP 0.743 (95% CI 0.654-0.816); LR+ 2.643 (95% CI 1.858-3.761); and LR- 0.432 (95% CI 0.309-0.604). The unadjusted AUC was 0.711 (95% CI 0.635-0.787), adjusted for sex and age 0.753 (95% CI 0.683-0.824).

Conclusion: The FRC appears to be a valid questionnaire, identifying impaired balance in community-dwelling seniors.

Keywords: Community-dwelling elderly; Geriatric assessment; Mobility; Questionnaire; Short physical performance battery.

Argentinian Spanish Adaptation of the Activities-specific Balance Confidence (ABC) Scale

Verdecchia DH, Monzon AM, Dias de Carvalho T, Diaz Ballve LP, Felici DA. 2025 Jun 4;17(6):e85334.

DOI: 10.7759/cureus.85334 **PMID:** 40621361 **PMCID:** PMC12227134

Abstract

Background There are diverse factors that increase the risk of falls for older adults. One of the most important is a lack of confidence when performing everyday activities. The Activities-specific Balance Confidence (ABC) Scale, developed in Canada, is used to quantify the perception of confidence in balance on the part of an older adult when carrying out habitual activities. As yet, an Argentine version of the ABC does not exist. The objective of this study was to translate, culturally adapt, and evaluate the internal consistency of the ABC Scale questionnaire for use in the Argentine adult population over 65 years of age.

Materials and methods The translation and transcultural adaptation process followed the World Health Organization guidelines for instrument adaptation. This included (1) independent forward translation by bilingual experts; (2) synthesis by a multidisciplinary panel; (3) back-translation to verify conceptual equivalence; and (4) pretesting with cognitive debriefing in the target population. Participants were community-dwelling adults aged 65 years or older who were literate and capable of walking independently or with assistive devices. Internal consistency was evaluated using Cronbach's alpha coefficient.

Results A total of 30 subjects with a median age of 69.5 years participated; 70% of these were women. Five of the 16 items in the ABC were modified for the transcultural adaptation. The median of the ABC was 83.6% (IQR: 67.2-98.4). A roof effect was observed in five (16.7%) of the subjects. The minimum value was 31.2 points. The result for internal consistency was acceptable (Cronbach's alpha: 0.92).

Conclusions The original version of the ABC Scale was successfully translated and culturally adapted for use in the older adult population in Argentina. The Argentine version demonstrated excellent internal consistency and was easily understood and completed by participants, confirming its feasibility in clinical settings. This culturally adapted tool provides healthcare professionals with a reliable instrument to assess balance confidence in older adults. Further studies are needed to validate its use in clinical populations with specific health conditions and to explore its applicability in fall prevention strategies.

Keywords: accidental falls; aged; patient health questionnaire; postural balance; trust.

A Clinical Audit of the Use of CT Head Scan Post-Inpatient Falls in Hospitalised Older Adults Utilising a Post-Fall Clinical Pathway

Watt I, Devin R, Bhattacharya J, Waldie F, Holden E, Wu CJ. Int J Environ Res Public Health. 2025 Jul 11;22(7):1098.

DOI: 10.3390/ijerph22071098 **PMID:** 40724165 **PMCID:** PMC12294211

Abstract

Background: Older adults are at high risk of falls, and head injuries following these events can have devastating consequences. The In-Patient Post Fall Clinical Pathway is a tool utilised in many hospitals in Queensland, Australia, to guide the need for CT brain imaging post-inpatient fall. This audit aimed to assess the use of CT imaging following inpatient falls in older adults, evaluate adherence to the In-Patient Post Fall Clinical Pathway, and explore factors associated with serious head injury.

Methods: A retrospective audit was conducted across two regional Queensland hospitals over 2.5 years. Falls involving patients aged over 65 years were included. Data were analysed using descriptive and bivariate statistical tests.

Results: Among 874 eligible falls, the mean patient age was 80.4 years, and approximately two-thirds were male. While 90.6% of patients who had fallen met clinical pathway criteria for a CT head scan, only 50.1% of them received a scan. Serious head injuries were uncommon (2.25% of total falls), with subdural haematoma being most frequent. Only one patient underwent neurosurgical intervention. No missed serious injuries were identified. No individual characteristic was significantly associated with serious head injury, although trends were observed for unwitnessed falls, falls from bed, falls with a head strike, new symptoms four hours post-fall, and anticoagulant use.

Conclusions: There is a gap between clinical pathway recommendations and imaging practices, with clinicians often relying on judgement over strict adherence to guidelines. Further research is needed to inform evidence-based and practical decision-making to balance imaging use with clinical risk.

Keywords: CT scan; clinical audit; head injury; inpatient falls; older adults.

Effects of Dual-Tasking on Stepping Strategy and Inter-Joint Coordination During Walking in Older Fallers and Non-Fallers

Zeng Z, Ho CY, Zhou J, Shen J, Yang Y. Innov Aging. 2025 May 24;9(6):igaf055.

DOI: 10.1093/geroni/igaf055 **PMID:** 40641563 **PMCID:** PMC12242380

Abstract

Background and objectives: Falls are a major public health concern among older adults, often leading to injuries, impaired mobility, and loss of independence. Dual-task walking, where a secondary task is performed while walking, simulates real-life challenges and is linked to fall risk. This study aimed to investigate how dual-tasking affects stepping strategies, inter-joint coordination, and coordination variability during walking in older adults with and without a history of falls.

Research design and methods: Twenty community-dwelling older adults (10 fallers, 10 non-fallers), aged 65 and older, completed a 2-min walking test under three conditions: single-task (ST) walking, motoric dual-task (MDT) walking (holding a glass of water), and cognitive dual-task (CDT) walking (serial subtractions). Gait data were collected using inertial measurement units. Stepping strategies were quantified by the changes in cadence and stride length, while inter-joint coordination was analyzed using vector coding. Two-way repeated measures ANOVA was used to assess task and group effects on variables.

Results: Task-specific adaptations were observed: MDT prompted greater stride length adjustments, while CDT led to more balanced cadence and stride length adjustments ($F = 8.346$, $p = .010$, $\eta^2 p = .317$). Fallers exhibited more anti-phase coordination in hip flexion-knee flexion than non-fallers during dual-task conditions ($p \leq .042$). In CDT walking, fallers showed a lower frequency of distal phase in hip flexion-knee flexion and a higher frequency of anti-phase in hip flexion-ankle dorsiflexion compared to ST ($p \leq .044$). Coordination variability decreased during MDT for hip flexion-ankle dorsiflexion in both groups compared to ST ($p \leq .027$).

Discussion and implications: This study provided better understanding on the differences of stepping strategies and phase-specific coordination patterns between older adult fallers and non-fallers, particularly under dual-task walking conditions. The conservative motor control strategies in fallers suggest a prioritization of stability over adaptability, potentially increasing fall risk during complex walking tasks.

Keywords: Cognitive; Falls; Gait; Stability; Variability.

Muscle Activation and Postural Sway in Response to Task Complexity: A Study of Balance Control in Older Adults

Zhang L, Sidarta A, Lim YC, Er C, Yan X, Wu TL, Ang WT. IEEE Int Conf Rehabil Robot. 2025 May;2025:82-87.

DOI: 10.1109/ICORR66766.2025.11063123 **PMID:** 40644078

Abstract

In this study, we investigate muscle activation patterns and postural sway in older adults across different stance conditions with varying challenges. Muscle activity from lower limb and trunk muscles was recorded in seven older adults during four stance tasks: double stance, tandem stance, tandem stance with a cognitive task, and tandem stance with combined cognitive and motor tasks (TSCM). We analyzed CoP (centre of pressure) features, EMG (electromyography) patterns, and the coherence between EMG-CoP, to gain insights into neuromuscular coordination and balance control. Our findings indicate that task complexity significantly impacts postural stability, with tandem stances-particularly TSCM-leading to increased instability along the anterior-posterior axis. Key stabilizing muscles, such as the gastrocnemius medialis and tibialis anterior, showed heightened activation and strong EMGCoP coherence under complex tasks, highlighting their essential role in counteracting gravitational forces to maintain balance. A lateral asymmetry in muscle activation was also observed, with left-side muscles consistently showing greater activity than right-side counterparts, suggesting lateralized contributions to postural control. These results emphasize the importance of specific muscles for stability in challenging postural tasks and may offer valuable insights for designing targeted interventions, including robotic rehabilitation systems and assistive technologies, to enhance balance and reduce fall risk in older adults.

Feasibility and Impact of an Outdoor Physical Activity Park for Older Adults to Encourage Healthy Aging and Maintain Independence

Zilbershlag Y, Zaltsman SL, Been E. Health Promot Pract. 2025 Jul 8:15248399251349463.

DOI: 10.1177/15248399251349463 **PMID:** 40626328

Abstract

Physical activity may maintain and improve overall health and well-being throughout one's lifetime. Among older adults, improved physical function can reduce fall risk, cognitive decline, and improve overall psychological well-being. Despite these numerous benefits, older adults often encounter barriers to regular exercise, including limited accessibility, lack of motivation, and financial constraints. Placement of designated outdoor physical activity parks specifically designed for older people may offset these barriers. This pilot study assessed the feasibility of using outdoor parks to encourage physical activity and improve motor and cognitive function, and quality of life among older people. Independent participants were recruited from the community, and frail participants from the day center adjoining the park. Participants completed pre-/post-intervention evaluations [Activities of Daily Living [ADL], Instrumental Activities of Daily Living Scale [IADL], World Health Organization Quality of Life Questionnaire-Brief [WHOQoL-BREF], falls questionnaire, Montreal Cognitive Assessment [MoCA] assessment and the Timed Up and Go [TUG], Uni Pedal Stance Test [UPST], and 30 seconds sit to stand test [$_{30}$CST] tests]. Exercise sessions lasted 30 to 45 minutes, were supervised by a health professional, and provided twice weekly over an 8-week period; 33 participants (66-87 years), completed the program. Among frail participants, a significant improvement was noted in TUG test results [$F(1, 30) = 15.49$, $p < .001$, $\eta^2 = .356$], indicating improved balance and reduced fall risk, and a marginally significant increase in the psychological quality of life was noted among independent participants [$F(1, 30) = 3.62$, $p = .067$, $\eta^2 = .108$]. Overall participant satisfaction was high. An outdoor park intervention among older frail and independent adults may have a significant positive impact on physical and psychological health variables and future research should be encouraged in this area.

Keywords: healthy aging; older adults; outdoor physical activity park.