

Featured Falls Research – November

The relationship between fall risk, trochanteric soft tissue thickness, and hip fracture risk in older adults

Johannesdottir F, Aspelund T, Mahar S, Sigurdsson S, Gudnason V, Bouxsein ML. J Bone Miner Res. 2025 Oct 31:zjaf161.

DOI: [10.1093/jbmr/zjaf161](https://doi.org/10.1093/jbmr/zjaf161)

PMID: 41172142

Abstract

Current fracture risk assessment does not directly include fall probability, despite most hip fractures resulting from falls. Additionally, the role of trochanteric soft tissue thickness (TST) in hip fracture risk remains unclear. This study aimed to develop a subject-specific fall risk tool and test whether incorporating fall probability and TST improves hip fracture prediction beyond FRAX alone in older adults from the AGES-Reykjavik study. Baseline data from 3242 individuals (58% women) were used to predict repeated falls (≥ 2 in 12 months) at follow-up (~ 5 years later) via multivariate logistic regression, considering age, sex, fall history, neuromuscular function, dynamic balance, and medication use. In a case-cohort study (698 hip fractures, 1348 controls; median follow-up 10 years), Cox proportional hazards models assessed hip fracture risk. We compared the predictive value of fall probability and TST combined with FRAX against FRAX alone using time-dependent AUC at 5-, 10-, and 16-year follow-up. At follow-up, 295 individuals had ≥ 2 falls in the past year. The best model for future falls included a timed up-and-go test, fall history, and grip strength. The probability of falling predicted incident hip fracture and improved hip fracture prediction beyond FRAX, in both men and women. The improved predictive value of fall risk was greater among men than women (e.g. AUC for predicting 10 yrs hip fracture risk, 0.83 (95%CI 0.79-0.87) in men vs 0.75 (95%CI 0.72-0.78) in women). Lower TST was linked to higher hip fracture risk in women but not men. However, adding TST to a model with fall probability and FRAX among women did not enhance time-dependent AUC ($p > 0.10$). In conclusion, fall probability significantly improves hip fracture prediction beyond FRAX, particularly in men. Thus, subject-specific fall risk assessment may enhance clinical evaluation of hip fracture risk in older adults.

Keywords: BMD; Fall; Fracture risk assessment; Hip Fracture; QCT.

Prevalence and Risk Factors for Falls in Older Adults With Diabetes: A Systematic Review and Meta-Analysis

Liu T, Lin Y, Hua Y, Yao J, Qi R, Chen X, Xiao Y, Xu W. J Am Med Dir Assoc. 2025 Nov 26:106012.

DOI: [10.1016/j.jamda.2025.106012](https://doi.org/10.1016/j.jamda.2025.106012)

PMID: 41318106

Abstract

Objectives: To investigate the prevalence of falls and to assess risk factors associated with falls in older adults with diabetes.

Design: A systematic review and meta-analysis.

Setting and participants: Older adults with diabetes (≥60 years).

Methods: The literature search encompassed international (PubMed, Web of Science, Embase, Cochrane Library) and Chinese databases (CNKI, Wanfang, VIP, CBM) using systematic methods. The first search was conducted in June 2024, and the search was updated in May 2025. The 2 researchers independently conducted study selection, quality assessments, and data extraction. The meta-analysis was conducted using Stata 16.0 and RevMan 5.3. Pooled incidence rates and odds ratios for the prevalence of falls in older adults with diabetes, as well as for risk factors examined comparably in at least 2 studies, were calculated using fixed or random-effects models.

Results: The systematic review screened 5699 articles, ultimately analyzing data from 32 studies that included 23,666 older adults with diabetes. The pooled prevalence of falls in older adults with diabetes was 29.5%. This risk factor synthesis pooled data from 20 eligible studies, 15 distinct factors demonstrated statistically significant associations with falling incidents, including age, gender, timed up and go test, handgrip strength, cognitive dysfunction, depression, use of walking aids, gait issues, balance difficulties, weight loss, visual function abnormalities, diabetic retinopathy, hypoglycemia, diabetic peripheral neuropathy, and sleep quality.

Conclusions and implications: Older adults with diabetes present a higher risk of falls. Health care providers should screen for factors associated with elevated fall risk and implement early interventions targeting modifiable risk factors to mitigate fall incidents in older adults with diabetes.

Keywords: Diabetes mellitus; falls; older adults; prevalence; risk of falls; systematic review and meta-analysis.

Risk Factors for Falls and Recurrent Falls in Older Stroke Survivors: A Systematic Review and Meta-Analysis of Prospective Studies

Xie M, Taylor-Piliae RE, Yang C, Peng X, Yang Q, Zhang Q. Int J Older People Nurs. 2025 Nov;20(6):e70050.

DOI: [10.1111/opn.70050](https://doi.org/10.1111/opn.70050)

PMID: 41152212

Abstract

Background: Falls are a serious complication often associated with stroke in the older population. However, a comprehensive review of risk factors specific to falls in older stroke patients is currently lacking.

Aims: To fill this gap by synthesising prospective studies and providing evidence-based insights into the risk factors for falls and recurrent falls in older stroke survivors.

Design: Systematic review and meta-analysis following PRISMA statement.

Methods: Two researchers independently screened eligible references and assessed their quality. Pooled summary effects, in the form of odds ratios with 95% confidence intervals, were calculated using a random-effects model.

Data sources: A systematic search of PubMed, Cochrane Library, Embase, Web of Science, Scopus, PsycINFO and CINAHL up to 4 January 2025.

Results: Our systematic review and meta-analysis included 22 studies. We identified five key domains predicting falls: (1) balance and mobility, encompassing impaired mobility, impaired balance, motor impairment and disability in self-care; (2) environmental factors, particularly the use of walking aids; (3) psychological factors, notably depression status; (4) medication factors, including the use of medications; and (5) sociodemographic factors, such as a history of falls. Importantly, a history of falls significantly increases the risk of recurrent falls.

Conclusions: Falls are a pressing concern in older stroke patients, with key risk factors including balance and mobility problems, use of walking aids, depression and medication. Future research should focus on mechanistic insights and tailored prevention strategies for this vulnerable group.

Keywords: falls; meta-analysis; older; recurrent falls; risk factors; stroke survivors.

Efficacy of Tai Chi and Roliball Exercise on Balance, Mobility, and Cognitive Function in Community-Dwelling Older Adults: A Randomized Controlled Trial

Yang Y, Li E, Hua Y, Yang X, Zhao Z, Zhu X, Li X, Tang J. Clin Interv Aging. 2025 Nov 12;20:1975-1992.

DOI: [10.2147/CIA.S556687](https://doi.org/10.2147/CIA.S556687)

PMID: 41255935

Abstract

Objective: Falls are a major public health concern for older adults, and exercise is considered a key strategy for fall prevention. This study aimed to evaluate the efficacy of a novel combined intervention of Basic Tai Chi and Roliball on balance, mobility, and cognitive function in community-dwelling older adults, and to compare its effects with traditional Tai Chi programs, thereby providing a novel structured physical activity approach for localized fall prevention and control.

Patients and methods: One hundred and thirty-five participants aged ≥ 60 years were divided equally into structured Basic Tai Chi combined with Roliball demonstration (TC+RB-D), Basic Taichi Chuan (TC) and 24-form simplified Tai Chi (24-TC). During the 12-week intervention period, participants attended three in-person sessions per week (90 minutes/session). All measures were assessed before and after the intervention.

Results: Compared with the 24-form Tai Chi group, the TC group and TC+RB-D group showed significant improvements in GS, TUG, BBS, and MoCA. The TC+RB-D group showed significant improvement on the mFES ($\beta=0.463$, 95% CI: 0.366-0.561, $p<0.001$). The TC group demonstrated a unique advantage on the EC-SLS ($\beta = 2.705$, 95% CI: 0.989-4.421, $p = 0.002$). The TC+RB-D group was not inferior to the traditional 24-form simplified Tai Chi in functional fall risk testing and cognitive function assessment.

Conclusion: This study developed a structured physical activity program rooted in Tai Chi culture. This multimodal exercise approach may have significant benefits for older adults in maintaining balance, enhancing mobility, and preserving cognitive function.

Keywords: Roliball; Tachi; balance; cognitive; exercise; fall; older.

Falls Research – November

A Mixed Methods Exploration of Temporospatial Fall Alert Patterns in Australian Aged Care Settings

Afzal N, Nguyen AD, Lau AYS. Appl Clin Inform. 2025 Oct;16(5):1664-1676.

DOI: [10.1055/a-2638-8750](https://doi.org/10.1055/a-2638-8750)

PMID: 41202855

PMCID: PMC12594566

Abstract

Falls among adults over 60 are a global health concern, including Australia. This study aimed to investigate temporospatial fall alert patterns across time and location detected by ambient fall detection sensors in three Australian aged care settings, to inform fall prevention strategies. A mixed-methods approach was used to analyze fall alert patterns and fall risks. Ambient fall detection sensors collected data from three care settings (residential aged care facilities [RACFs], retirement villages [RVs], and home dwelling communities [HDCs]; $n = 31$ households). Quantitative analysis involved fall alerts, temporospatial analysis by time of day and location. Qualitative insights were obtained through semistructured interviews with 14 older adults and 9 caregivers to understand fall risks. Distinct fall alert patterns emerged. In RACFs, alerts were most frequently recorded in bedrooms at night, linked to physical limitations and cognitive decline. RVs showed a more even distribution of alerts throughout the day, influenced by mobility issues, social activities, and pets affecting sensor accuracy. HDCs had the lowest fall alert rates, with nighttime alerts mainly in bedrooms, reflecting residents' physical status and strong family support. Qualitative data underscored the effect of cognitive and physical impairments in RACFs, mobility challenges, social activities, and pet influences in RVs, and shared living arrangements in HDCs. Fall alert patterns varied across RACFs, RVs, and HDCs, requiring tailored strategies. In RACFs, prevention should focus on nighttime safety with improved monitoring and bed alarms. Medication reviews are important, as many residents take medications affecting balance and cognition, increasing nighttime fall risks. In RVs, mobility programs and sensor accuracy improvements are needed to reduce false alerts from pets or daily activities. In HDCs, where alerts were fewer, more adaptable fall detection technology is needed to address the effect of shared bedrooms at night.

Implementing the world falls guidelines in Sweden: implications for a knowledge support tool and practice

Arkkukangas M, Thunborg C, Nygård S, Avby G. Age Ageing. 2025 Oct 30;54(11):afaf320.

DOI: [10.1093/ageing/afaf320](https://doi.org/10.1093/ageing/afaf320)

PMID: 41206100

PMCID: [PMC12598761](https://pubmed.ncbi.nlm.nih.gov/41206100/)

Abstract

Background: As the older population grows rapidly, the incidence of falls and fall-related injuries is rising, underscoring the urgent need for systematic, evidence-based fall prevention.

Objective: This study aimed to examine the implementation of the World Falls Guidelines for falls prevention in a region of Sweden, with particular attention to the implications of anchoring and developing a knowledge support tool within policy and practice.

Methods: A participatory research design was employed, involving five diverse settings: primary care, hospital care, homecare, municipal social services and pensioners' organizations. Data collection included workshops, field notes and written material. Early implementation processes focused on anchoring and developing, aligning with the i-PARIHS framework. The data were analysed using a framework analysis.

Results: The anchoring process revealed a lack of managerial support at the appropriate organizational level, which hindered cross-sectoral collaboration. Further, the developing process refined the content structure to better address the needs of both professionals and older adults. Seven themes were mapped by using i-PARIHS framework: (i) Innovation-adoption and adaptation, risk assessment; (ii) Recipients-intermediate managerial decision-making; (iii) Context-collaboration and resources, documentation and information sharing and accessibility and outreach and (iv) Facilitation-project or process.

Conclusion: Successful implementation requires anchoring and organizational alignment across all levels, with particular emphasis on the engagement of intermediate management. While the primary challenges emerge at the organizational (meso) level, they are closely interconnected with both micro-level and macro-level influences. Coordinated efforts across all levels are therefore essential for effective implementation strategies.

Keywords: co-creation; collaboration; fall prevention; implementation; older adults.

Vision screening in older adults who attend hospital following a fall: a scoping review

Baig A, Radford K, Cowley A, Mehta J, Gordon A, Christian J, Ibrahim L, Akkurt M, Ali M, Self E. BMC Geriatr. 2025 Nov 25;25(1):955.

DOI: [10.1186/s12877-025-06435-1](https://doi.org/10.1186/s12877-025-06435-1)

PMID: 41291483

Abstract

Background: The assessment of impaired vision is included in falls prevention guidance for older adults, but implementation is variable. We conducted a scoping review to better understand current practice and inform future implementation research around vision assessments for older adults attending acute hospitals following a fall. We explored the extent and types of evidence, key concepts, methods, emerging topics and identified evidence gaps.

Methods: JBI methodology was followed. MEDLINE, AMED, EMBASE, PsychInfo, CINAHL and WebofScience were systematically searched for literature on the assessment of vision in older adults attending acute hospitals following a fall. Sources eligible for inclusion had a mean/median population age of 65 years or over, included patients presenting to an acute hospital setting following a fall and described vision assessments in these patients. Grey literature, conference abstracts and sources without a full text were excluded. Title, abstract and full-text screening were completed by two independent reviewers. Data extraction and charting of the data were performed by the primary author. Data analysis comprised descriptive statistics of study characteristics and content analysis of vision assessment methods used.

Results: We included 27 studies from 13 countries, between 1806 and 2024. Studies reported various vision assessment methods. Questions frequently asked in vision assessments included: presence of visual symptoms (n = 9), date of last eye test (n = 9) and previous ocular history (n = 5). The most common visual function assessed was distance visual acuity (n = 12). Six studies used standardised screening tools, including: the Stopping Elderly Accidents, Deaths & Injuries (STeADI) 12-question falls risk screening tool, a modified Kombinert Alvorlig Sansesvikt (Combined Serious Sensory Impairment) (KAS-Screen), procedures of the InterRAI-AC, the St Thomas's Risk Assessment Tool In Falling elderly inpatients (STRATIFY), the Physiological Profile Assessment (PPA) and the Look Out! Bedside vision check. The most common post-screening interventions were: advising an eye test with an optometrist (n = 8), advising an ophthalmology referral (n = 7) and patient education (n = 6).

Conclusions: The literature on vision screening in this population was sparse and there was heterogeneity in current practices, highlighting the need for standardised screening protocols. More research is needed to evaluate vision screening services in this population and to explore implementation barriers.

Keywords: Ageing; Falls; Vision; Vision screening.

Psychometric properties of instrumented tools and outcome measures to assess dynamic, anticipatory and reactive balance in older adults: A scoping review

Bulow AM, Oates AR, Olarinde F, Singer JC, Van Ooteghem K, Sibley KM. Gait Posture. 2025 Nov 13;124:110054.

DOI: [10.1016/j.gaitpost.2025.110054](https://doi.org/10.1016/j.gaitpost.2025.110054)

PMID: 41242281

Abstract

Background: Many technologies are available to assess balance; however, there is not one comprehensive option that meets all requirements for each component of balance.

Objective: To identify what instrumented measurement tools and subsequent outcome measures have been established to quantify dynamic, anticipatory, and reactive balance in adults ≥ 65 years old.

Methods: MEDLINE, EMBASE, and CINAHL databases were searched for studies published in English that evaluated one or more psychometric property of instrumented measurement tools and outcome measures to assess dynamic, anticipatory, or reactive balance in adults ≥ 65 years old. Data extraction included participant characteristics, balance component(s), instrumented measurement tools and outcome measures, and psychometric analyses.

Results: Twenty-five studies were included. IMUs are the most commonly reported instrumented measurement tool used to assess anticipatory postural control and dynamic stability while force plates have also been established as valid and reliable for assessing all three components of balance. Test-retest validity and criterion reliability have been established to assess anticipatory postural control and dynamic balance using six outcome measure via IMUs ($n = 4$) and force plates ($n = 2$). Reactive postural control was assessed using two outcome measures via force plates.

Significance: Minimal valid and reliable instrumented measurement tools and outcome measures were identified for anticipatory postural control and dynamic stability, and even fewer for reactive postural control. Additional work is needed to establish evidence-based guidance for selecting an instrumented measurement tool and outcome measure(s) to evaluate dynamic, anticipatory, and reactive balance control to appropriately develop and progress balance exercises in community fall prevention programs.

Keywords: Balance assessment; Reliability; Validity.

Push-Pull Ratio and Ankle Dorsiflexion Strength in Nurse Home Residents: Novel Insights Into Fall Prevention Strategies

Del-Cuerpo I, Jiménez-Lupi3n D, Rubio-Oltra J, Chiroso-R3os I, Chiroso-R3os LJ, Jerez-Mayorga D.
Physiother Res Int. 2026 Jan;31(1):e70132.

DOI: [10.1002/pri.70132](https://doi.org/10.1002/pri.70132)

PMID: 41312591

Abstract

Background and purpose: Falls are a leading cause of disability and mortality in older adults. Muscle strength, neuromuscular activation, and balance, particularly the push-pull ratio (PPR), play key roles in fall prevention. The purpose of this study is to analyze among muscle strength, time to peak force (TP), and PPR between fallers and non-fallers in nursing home residents.

Methods: A total of 51 older adults participated in the study. Participants were classified as fallers or non-fallers based on their fall history in the past year. Isometric muscle strength assessments were conducted using a functional electromechanical dynamometer (FEMD) to evaluate knee extension, ankle dorsiflexion, bilateral seated bench press, and bilateral seated row. The PPR was calculated as the ratio of push to pull peak force (PF).

Results: No significant differences were found in knee extension or upper limb strength parameters. However, fallers exhibited significantly higher ankle dorsiflexion PF ($p = 0.013$), mean force (MF) ($p = 0.034$), and impulse ($p = 0.011$), along with a longer TP ($p = 0.017$). Additionally, fallers demonstrated a significantly lower PPR ($p = 0.032$), indicating a possible imbalance between pushing and pulling movements.

Discussion: These findings suggest that fallers may rely more on dorsiflexor strength, potentially as a compensatory mechanism for deficits in proximal muscle activation. The lower PPR highlights the importance of muscle balance in postural stability. Future interventions should consider targeted neuromuscular training to enhance explosive strength, improve muscle coordination, and reduce fall risk in older adults.

Keywords: aging; frailty; muscle quality; muscle strength dynamometer.

Transition from MHealth FallSA[®] to FallSA[®] 2.0: A randomized trial on enhancing behavioral and functional outcomes in community-dwelling older adults

Goh JW, Shahar S, Tan SY, Singh DKA. Digit Health. 2025 Nov 10;11:20552076251390931.

DOI: [10.1177/20552076251390931](https://doi.org/10.1177/20552076251390931)

PMID: 41229938

PMCID: [PMC12602928](https://pubmed.ncbi.nlm.nih.gov/41229938/)

Abstract

Background: Optimistic fall risk screening has been recommended in recent global fall prevention guidelines. While fall screening mobile application (FallSA[®]) is acknowledged for its acceptance and reliability, its effectiveness in modifying fall prevention behaviors remains underexplored.

Objectives: In this study, we aimed to investigate the effects of FallSA[®] on fall prevention behavior and functional outcomes among community-dwelling older adults. The transition to its upgraded version, FallSA[®] 2.0 was also reported.

Methods: A six-month randomized controlled trial included 59 participants: the experimental group ($n = 30$, mean age 66.2 ± 5.3 years) and the control group ($n = 29$, mean age 69.2 ± 5.0 years). The experimental group received fall prevention education and used FallSA[®], while the control group received the education only. Outcomes included fall prevention awareness, knowledge, balance confidence, physical function and physical activity levels.

Results: While no significant time \times group interaction and group effects ($p > .05$), time effects were observed for improvements in FallSA[®] risk score ($p = .03$), balance confidence ($p = .009$), behavior ($p = .001$), and physical function ($p = .008$), the experimental group demonstrated a larger mean change in fall behavior, balance confidence, FallSA[®] risk score, and physical activity level compared to the control group ($p < .05$ for all parameters). Limitations in FallSA[®] were addressed in FallSA[®] 2.0 by incorporating an enhanced educational package, Sit-to-Stand test with normative values, and improved monitoring system for health professionals.

Conclusion: The findings suggest that FallSA[®] has the potential to enhance fall prevention behaviors and awareness, which has been successfully integrated in FallSA[®] 2.0. Future studies are needed for broader applicability of FallSA[®] 2.0 in fall prevention strategies among older adults.

Registry: Australian New Zealand Clinical Trials Registry.

Clinical trial number: ACTRN1262200112076.

Keywords: Early falls screening; falls prevention; falls risk assessment; mobile application; older adults.

Adapting an emergency department fall prevention intervention for persons living with dementia through patient, caregiver, and expert interviews

Goldberg EM, Tietbohl CK, García-Hernández S, Bounds M, Picazo JG, Lum HD. Sci Rep. 2025 Nov 21;15(1):41399.

DOI: [10.1038/s41598-025-25290-z](https://doi.org/10.1038/s41598-025-25290-z)

PMID: 41271962

PMCID: [PMC12638784](https://pubmed.ncbi.nlm.nih.gov/41271962/)

Abstract

Study objective Although falls are up to three times more common in persons living with dementia (PLWD), limited fall prevention interventions exist for this population. Adapting promising interventions, such as the GAPcare intervention, which reduced fall-related ED visits by 66% and did not prolong ED length of stay, may address this need. In GAPcare patients receive pharmacy and physical therapy (PT) consultation to reduce modifiable risk factors for falls prior to ED discharge. In this qualitative descriptive study, we conducted semi-structured interviews with PLWD who recently visited the ED, their caregivers, and national experts in dementia care or ED operations to elicit perspectives on how GAPcare should be adapted for PLWD. Interviews were conducted in English and Spanish. We analyzed interviews using rapid qualitative analysis guided by Castro's framework for adapting prevention interventions. We interviewed 7 patients, 2 caregivers, and 15 experts (5 physicians, 3 nurses, 3 PTs, 3 pharmacists, 1 PhD scientist). Participants strongly supported improved ED falls care for PLWD. They also indicated that tailoring at multiple levels (patient and caregiver, ED, and external factors, e.g., insurance status) would be required to support the complexities in PLWDs' circumstances (e.g., living arrangements, income) and cognitive abilities. Participants suggested training of ED staff in dementia care and caregiver support. PLWD, caregivers, and experts in dementia care and ED operations are supportive of adapting our existing GAPcare intervention for PLWD. Early feedback from relevant informants guided GAPcareAD intervention refinement and fit with ED workflows.

A Systematic Review of Ambient Assisted Living and Smart Home-Related Technology Performance

Gorce P, Jacquier-Bret J. *Sensors* (Basel). 2025 Oct 23;25(21):6540.

DOI: [10.3390/s25216540](https://doi.org/10.3390/s25216540)

PMID: 41228764

PMCID: [PMC12609574](https://pubmed.ncbi.nlm.nih.gov/41228764/)

Abstract

Fall detection systems in ambient assisted living (AAL) and smart homes are essential for the comfort, safety, and autonomy of elderly people. The aim of this study was to investigate the performance of these systems considering categories of sensors and methods used. A systematic review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Seven open databases were screened without a date limit: PubMed/MedLine, Google Scholar, ScienceDirect, Science.gov, Academia, IEEE Xplore, and Mendeley. The article selection and data extraction were performed by two authors independently. Among the 473 unique records, 80 studies were selected. Five fall detection performance parameters (accuracy, precision, sensitivity, specificity, F1-score) and two computation speed parameters (training and testing time) were extracted and classified according to three sensor categories (wearable, non-wearable, and hybrid solutions), and four methods (deep learning, machine learning, threshold, and all others). The ANOVA results showed that wearable sensors performed the worst in fall detection. Deep learning methods produced the best results for the five parameters. Identifying the advantages of different solutions is a major challenge for researchers, practitioners, and policymakers in the design and implementation of more effective fall detection systems.

Keywords: AAL; F1-score; accuracy; elderly; fall detection; precision; sensitivity; smart home; specificity; wearable and non-wearable sensors.

A Qualitative Evaluation Exploring Co-Production of Falls Management in Care Homes

Hallam-Bowles F, Kilby A, Gordon A, Timmons S, Logan P, Rees L, Lawry W; CHAFFINCH stakeholder group; Robinson K. Health Expect. 2025 Dec;28(6):e70500.

DOI: [10.1111/hex.70500](https://doi.org/10.1111/hex.70500)

PMID: 41261769

Abstract

Background: Co-production approaches are increasingly used in research but are rarely evaluated in care home settings. This study explored factors influencing key principles of co-production in a series of workshops around falls management in care homes.

Methods: Stakeholders (care home residents and relatives, care home staff, and health and social care staff) participating in co-production workshops as part of a research study were invited to take part in this qualitative evaluation. The workshops were developing a model to implement falls training in care homes as part of a systemic action research study. Non-participant observations of workshops explored stakeholder interactions. Stakeholders participated in reflection meetings about their experiences of co-production. Framework analysis mapped key themes to the National Institute for Health and Care Research's (NIHR) principles of co-production.

Results: Nine themes were identified. Sharing power was affected by two themes: opportunities to challenge dominant voices, resulting from the influence of the research team and separate stakeholder groups, and integrating a disjointed system. Including all perspectives and skills was influenced by two themes: involvement of key stakeholders and a flexible approach. Respecting and valuing knowledge was impacted by two themes: respecting and utilising expertise and experience, and confidence. Two themes relating to reciprocity were identified: benefits and potential harms. One theme related to building and maintaining relationships: team dynamics.

Conclusions: Co-production in this context is complex and affected by multiple factors. Separate stakeholder groups, a flexible approach and recognising different experiences and expertise facilitated co-production in line with its key principles. Potential reputational risks, confidence levels and limited involvement of residents, relatives and care home staff in a variety of roles were identified as barriers. Future studies in care homes should consider organisational power dynamics and create safe spaces, providing opportunities for inclusive participation.

Patient and public contribution: A collaborator group, including a patient and public involvement and engagement (PPIE) advisor and health and social care professionals, contributed to the research methods, presentation of findings and authorship. Care home residents informed the design of the co-production workshops.

Keywords: co-creation; co-design; falls prevention; long-term care.

Bilateral balance improves in low and high fall risk groups after unilateral total ankle arthroplasty

Hansen RM, Weiss SI, Arena SL, Queen RM. Clin Biomech (Bristol). 2025 Nov 21;131:106719.

DOI: [10.1016/j.clinbiomech.2025.106719](https://doi.org/10.1016/j.clinbiomech.2025.106719)

PMID: 41308436

Abstract

Background: Ankle osteoarthritis (OA) affects ~1 % of the global population and impairs postural stability, increasing fall risk. Total ankle arthroplasty (TAA) is one of the most common surgical treatments, but balance impairments may persist post-op. The study examined differences in load symmetry across time for patients with ankle OA and post-TAA at low (LFR) or high fall risk (HFR) and then compared these groups with healthy controls.

Methods: All participants completed a balance assessment consisting of four static stances: shoulder width (BS), feet together (BFT), semi-tandem, and tandem. Fall risk was determined pre-operatively. Ground reaction forces were collected using force plates (AMTI, Watertown, MA) and load symmetry was calculated using the normalized symmetry index (NSI). A mixed effects model analyzed interactions between group (LFR, HFR) and time (pre-op, post1yr, post2yr) for the BS and BFT stances. A chi-square analysis examined changes in fall risk group assignment over time. Differences between healthy controls and the LFR and HFR groups at post2yr were examined with a mixed effects model.

Findings: HFR participants showed a significant decrease in average NSI from pre-op to post1yr ($p < 0.001$) and post2yr ($p = 0.001$) for BS. BFT NSI decreased significantly from pre-op to post2yr. The chi-square test indicated a significant shift toward LFR classification at post2yr ($p = 0.021$). At post2yr, there were no significant NSI differences between LFR, HFR, and controls.

Interpretations: TAA improves load symmetry during quiet standing, with high fall risk participants showing the most pronounced changes, indicating the potential to reduce fall risk in post-TAA older adults.

Keywords: Older adults; Pain; Postural stability; TAA; VAS.

Older adult frontal plane balance during 90 degree turns while walking

Hirsch ZM, Tillman M, Liu JM, Molino J, Zaferiou A. Sci Rep. 2025 Nov 6;15(1):38921.

DOI: [10.1038/s41598-025-22800-x](https://doi.org/10.1038/s41598-025-22800-x)

PMID: 41198774

PMCID: [PMC12592708](https://pubmed.ncbi.nlm.nih.gov/41198774/)

Abstract

This study examined how older adults regulated their balance during turns relevant to everyday mobility, towards informing future fall-risk mitigation approaches. Sixteen healthy older adults participated in this study. Balance biomechanics were quantified using whole-body optical motion capture. Three tasks were performed 10-14 times: straight line gait, 90° pre-planned left turns, and 90° late-cued left turns that were cued visually. Frontal plane angular momentum ranges and the minimum horizontal distance between the center of mass and lateral edge of the base of support (lateral distance) were compared across tasks using linear mixed models. Lateral distance minima were larger during straight-line gait than either turning task, and larger during late-cued than pre-planned turns. Group-level analysis showed that frontal plane angular momentum ranges were smaller during straight-line gait than during either turn task. Participant-specific analyses revealed that not all participants followed the group-level statistical findings for angular momentum, with some demonstrating the opposite behavior. To explore these diverse balance behaviors, preliminary explorations found significant associations between balance state extrema and baseline assessment scores (e.g., greater concern about falling was associated with smaller angular momentum ranges). Additionally, this study prompts more thoughtful interpretations of balance biomechanics when attempting to characterize an individual's fall-risk.

Keywords: Angular momentum; Balance; Gait; Lateral distance; Older adult; Turn.

Comparing the effectiveness of two community-based multimodal exercise programs (CMEPs) on physical activity, performance, fall prevention, and quality of life in older adults: protocol for a multicenter, double-blind, randomized clinical trial

Hossain KMA, Hossain KMA, Sarker SN, Kabir MF, Hossain MZ, Jahan S, Rahman E, Sharna SY, Rikti JF. *Trials*. 2025 Nov 14;26(1):505.

DOI: [10.1186/s13063-025-09245-3](https://doi.org/10.1186/s13063-025-09245-3)

PMID: 41239406

PMCID: [PMC12619309](https://pubmed.ncbi.nlm.nih.gov/41239406/)

Abstract

Background: Aging leads to physiological decline, increasing the risk of frailty, sarcopenia, and falls, which impact older adults' physical activity, performance, and quality of life. Exercise is recommended for mitigating these effects, yet the optimal approach remains unclear. This trial will compare two community-based multimodal exercise programs—sensorimotor and strengthening exercise—to evaluate their effectiveness in enhancing physical activity, performance, fall prevention, and quality of life. The findings will guide evidence-based recommendations for promoting functional independence and healthy aging among community-dwelling older adults.

Methods: This trial will be a multicenter, double-blind, parallel, randomized clinical trial in which 140 older adults will be enrolled from July 2025 to May 2026 in Bangladesh. Eligible participants will be allocated into two groups for community-based multimodal exercise programs (CMEPs) at a 1:1 ratio: CMEP-I: sensorimotor exercise group; CMEP-II: strengthening exercise group. The exercise programs will last for 24 sessions/8-week, with a 24-week follow-up. The major outcome measurements will include physical activity, performance, fall prevention, and quality of life using a Physical Activity Scale for the Elderly (PASE), Short Physical Performance Battery (SPPB), Modified Falls Efficacy Scale (MFES), and 36-item Short Form Survey (SF-36). All outcomes will be assessed at pretest, posttest after 8 weeks, and follow-up after 32 weeks.

Discussion: This randomized clinical trial will investigate the comparative effectiveness of sensorimotor and strengthening exercise programs as community-based multimodal interventions for older adults. These findings will provide evidence on nonpharmacological strategies for improving physical activity, performance, fall prevention, and quality of life, particularly in resource-limited settings. The trial's robust design strengthens validity, although generalizability may be constrained. Long-term follow-up will provide insights into sustained benefits, potentially informing rehabilitation guidelines and policy recommendations to promote accessible, cost-effective exercise interventions for aging populations.

Trial registration: This trial is registered prospectively in the Clinical Trial Registry India (CTRI/2025/03/083260). Registered on 24/03/2025.

Keywords: Fall prevention; Multimodal exercise; Older adults; Physical activity performance; Quality of life.

Development and Usability of MSafe: A Fall Risk Application for Older Adults with Multiple Sclerosis

Hsieh KL, Backus D, Willingham TB, Sanford J. Sensors (Basel). 2025 Nov 20;25(22):7075.

DOI: [10.3390/s25227075](https://doi.org/10.3390/s25227075)

PMID: 41305282

PMCID: [PMC12656202](https://pubmed.ncbi.nlm.nih.gov/41305282/)

Abstract

Background: Falls are highly prevalent in older adults with Multiple Sclerosis (MS) and stem from a complex interplay of physiological, psychosocial, cognitive, and environmental risk factors. Fall risk assessments rely on in-person visits and occur infrequently, but mobile technology can provide portable, cost-effective, and multifactorial screening. The purpose of this study was to develop and evaluate the usability of a multifactorial fall risk app (MSafe) for older adults with MS. **Methods:** MSafe consists of 37 self-report questions, 9 quantitative cognitive and mobility assessments, and a final fall risk report. One-on-one semi-structured interviews were conducted with 21 older adults (>55) with MS. Participants independently used MSafe, were asked about their likes and dislikes, and completed the System Usability Scale (SUS). Interviews were video-recorded, transcribed, and coded into themes. **Results:** Three themes emerged: (1) simplicity of use, (2) progress monitoring, and (3) guidance and support. Overall, participants found MSafe easy to use, valuable to track and monitor their fall risk, and either confirmed or increased awareness of their own abilities. SUS scores averaged 84.9 ± 14.7 . **Conclusions:** MSafe is a comprehensive fall risk app that demonstrated high usability by older adults with MS. Future steps include implementing MSafe in home settings to examine fall risk management.

Keywords: aging; falls; mobile health; neurodegenerative; smartphone.

A Scoping Review of Principles of Multisensory Exercise Training Interventions in Older Adults Emphasizing Balance and Fall Incidence

Johari S, MacDermid J, Graham LJ, Ziebart CT, Shafiee E. J Geriatr Phys Ther. 2025 Nov 20.

DOI: [10.1519/JPT.0000000000000477](https://doi.org/10.1519/JPT.0000000000000477)

PMID: 41273263

Abstract

Background and purpose: Multisensory exercises target visual, vestibular, and somatosensory systems to improve balance and mobility, thus reducing fall risk in older adults. Unlike traditional exercise interventions focusing on physical strength or motor skills, multisensory exercises challenge sensory inputs to enhance adaptability and stability. Despite their potential benefits, the role of sensory training in balance improvement and fall prevention has not been extensively explored. This scoping review aimed to examine and summarize multisensory exercise interventions' content, delivery, and outcomes in older adults without specific health diagnoses.

Methods: A scoping review was conducted following Arksey and O'Malley's framework, encompassing stages such as identifying the research question, identifying relevant studies, study selection, charting the data, and synthesizing, summarizing, and reporting the results. Cochrane Library, Medline, PEDro, EMBASE, ProQuest, and Google Scholar were systematically searched using key terms such as "older adults," "multisensory," "balance," "exercise," and "fall." Studies were included if they evaluated the impact of multisensory exercises on balance and fall incidence in older adults without specific health diagnoses. The TIDieR checklist guided data extraction to ensure comprehensive reporting and analysis of intervention protocols.

Results and discussion: A total of 21 articles met the inclusion criteria, including 15 randomized controlled trials and 6 pre-post design studies without control groups. The total number of enrolled older adults was 1,018, 65% of whom were women. The review identified 4 principal categories of sensory interventions targeting visual, vestibular, proprioceptive modalities, and their combinations. Walking with sensory stimulation was the most common exercise intervention, featured in almost 60% of the studies. The Berg Balance Scale was the most frequently employed outcome measure, used in 42% of studies. However, the studies demonstrated considerable diversity in objectives, reporting, and intervention designs, including variations in exercise duration, frequency, intensity, and the specific sensory challenges applied. Additionally, inconsistencies were observed in the selection of outcome measures, with limited standardization across studies, making comparisons challenging.

Conclusion: Although multisensory interventions are widely used to improve balance, empirical evidence is limited by inconsistencies in study design, intervention delivery, and reporting. Greater theoretical clarity, operational definitions, intervention mapping, and codesign techniques are necessary to enhance the quality and impact of future research in clinical practice.

Keywords: balance; exercise training; fall incidence; multi-sensory; older adults.

Development and Health System Deployment of an Electronic Health Record-Integrated Chatbot Intervention for Connecting Fall Risk Screening to Community Resources After Emergency Department Visits: Implementation Study

Keleman A, Bounds M, Lunt M, Portz J, Ferozan B, Gomez Picazo J, Bookman K, Lum HD, Goldberg EM. JMIR Form Res. 2025 Nov 18;9:e77237.

DOI: [10.2196/77237](https://doi.org/10.2196/77237)

PMID: 41252184

Abstract

Background: Emergency departments (EDs) routinely screen for fall risk, but patients are rarely notified of their results or referred to preventive resources. There is a critical need for an intervention that notifies patients when they are at risk for falls and automates referrals to fall prevention programs without increasing clinician workload. Chatbots can be used to provide patient education and community resources in a conversational, friendly manner. We developed and implemented an automated intervention using our health system's electronic health record (EHR) and an artificial intelligence chatbot, Livi, to address this gap in fall prevention across 17 EDs.

Objective: This study aimed to share how we developed our fall risk notification and referral intervention and iteratively improved it based on end-user feedback.

Methods: We collaborated with the EHR and ED operations teams to automate patient notification of fall risk and referral. First, we leveraged existing fall risk screening questions in nursing documentation to identify patients at risk for falls. We then developed an EHR workflow that delivers a QR code in the after-visit summary for all high-risk patients at ED discharge. Scanning the QR code launches a conversation with Livi, guiding users to physician-vetted, evidence-based, free or low-cost fall prevention resources in their area. In this workflow, only ED patients who are screened as high risk receive linkage to Livi, and clinicians do not need to manually place referrals or enter specific fall prevention resources at discharge. We conducted rapid, iterative usability testing of the Livi falls chatbot with 93 community members during the development process at 3 community fairs in distinct settings.

Results: Rapid iterative testing led to enhancements in the intervention, such as increased font size, an option for Spanish language, additional geographic locations for fall prevention resources, home modification resources, the ability to self-assess for fall risk, fall prevention tips, and the ability for patients to leave feedback on the Livi chatbot. Because all EDs in the health system use the same instance of Epic, the EHR workflow was instantaneously deployed system-wide. The use of a QR code linked to the Livi chatbot also allows for the rapid updating of prevention resources.

Conclusions: This study describes the formative development and system-wide implementation of the intervention. This scalable, EHR-integrated intervention demonstrates a novel and pragmatic approach to improving population health by capitalizing on existing clinical workflows and automating both risk notification and personalized resource referral for older adults without increasing clinician burden. The next steps include conducting a randomized controlled trial to assess the impact of the screening and referral tool on recurrent fall-related health care use compared with routine care in the ED. Formal evaluation of the implementation outcomes will be conducted in the planned trial.

Keywords: digital health; emergency department; fall prevention; falls; high fall risk screening; older adults; referral pathway.

Multifactorial predictors of falls in older adults: a decade of data from the National Health and Aging Trends Study

Kohler-Voinov LC, Sayyid ZN, Cullen KE. BMC Geriatr. 2025 Nov 25;25(1):950.

DOI: [10.1186/s12877-025-06515-2](https://doi.org/10.1186/s12877-025-06515-2)

PMID: 41291488

PMCID: [PMC12645780](https://pubmed.ncbi.nlm.nih.gov/41291488/)

Abstract

Background: Falls are a leading cause of injury and loss of independence among older adults, yet comprehensive, population-level models that integrate diverse risk factors across broad demographic groups remain limited. Prior studies often focus on isolated variables or narrow subpopulations, limiting their generalizability.

Methods: To address this, we developed a robust, comprehensive model of fall risk among community-dwelling older adults using 11 years of data from the National Health and Aging Trends Study (NHATS), a longitudinal study of older adults in the United States designed to be nationally representative across a wide range of demographic and socioeconomic backgrounds. We conducted a retrospective analysis of 5,816 person-year observations from 2011 to 2022, applying univariate chi-squared tests and multivariable logistic regression to identify features associated with self-reported falls within a given month in the preceding year. Risk factors examined included sociodemographic characteristics, health status, cognitive function, and physical performance.

Results: Approximately 10% of respondents reported a fall during a specific time within the past year. Consistent features associated with increased fall risk included prior fall history, impaired balance, depressive symptoms, and use of mobility aids. Cross-category analyses revealed important variations in risk profiles by age, functional status and ability to perform certain exercises.

Conclusions: This study presents a decade-spanning model that reflects the multifactorial nature of fall risk and the diversity of aging trajectories in the U.S., providing a foundation for more inclusive and personalized fall prevention strategies.

Keywords: Activities of daily living (ADLs); Fall risk factors; Falls; Functional status; Multivariable modeling; NHATS; Older adults; Population-based analysis.

The Lived Experiences of Family Caregivers in Caring for Older Adults at Risk of Falls: A Phenomenological Study

Kurniawan D, Sahar J, Rekawati E, Sartika RAD. Int J Community Based Nurs Midwifery. 2025 Oct 1;13(4):295-306.

DOI: [10.30476/ijcbnm.2025.107116.2803](https://doi.org/10.30476/ijcbnm.2025.107116.2803)

PMID: 41185864

PMCID: [PMC12579784](https://pubmed.ncbi.nlm.nih.gov/41185864/)

Abstract

Background: Falls in older adults are a major public health issue, particularly in home-based care settings. Family caregivers play a critical role in caring for older adults at risk of falls. Therefore, this study aimed to explore the lived experiences of family caregivers in facing challenges and preventive care strategies for older adults at risk of falling in Indonesia.

Methods: A descriptive phenomenological study was conducted from December 2024 to April 2025 in Pekanbaru City, Riau Province, Indonesia, involving 12 family caregivers who provided care for older adults at risk of falling. Participants were selected using a purposive sampling technique. Data were collected through in-depth semi-structured interviews which lasted between 45 and 70 minutes. The interviews continued until no new experiential meanings emerged, indicating data saturation. All interview recordings were transcribed verbatim and analyzed manually using Colaizzi's seven-step method.

Results: The research identified five themes including: (1) stressors in caring for older adults, (2) declining health conditions of older adults, (3) fall-prone environments for older adults, (4) socio-cultural influences on care, and (5) fall prevention strategies.

Conclusion: This study supports the need for family-centered, community-based, and culturally sensitive interventions to assist family caregivers in preventing falls among older adults.

Keywords: Accidental falls; Aged, Caregivers; Elderly; Qualitative research.

Digital Healthcare Approaches for Fall Detection and Prediction in Older Adults: A Systematic Review of Evidence from Hospital and Long-Term Care Settings

Lee A, Lee H, Lee SH. *Medicina* (Kaunas). 2025 Oct 27;61(11):1926.

DOI: [10.3390/medicina61111926](https://doi.org/10.3390/medicina61111926)

PMID: 41303763

PMCID: [PMC12654721](https://pubmed.ncbi.nlm.nih.gov/41303763/)

Abstract

Background and Objectives: Falls are a leading cause of morbidity and mortality among older adults in hospitals and long-term care facilities (LTCFs). Digital healthcare approaches are increasingly being applied to fall detection and prevention; however, their effectiveness remains uncertain. This review evaluated the effectiveness, usability, and clinical applicability of detection- and prediction-based systems in institutional settings.

Materials and Methods: We systematically searched major international and Korean databases- PubMed, Embase, Ovid-MEDLINE, CINAHL, the Cochrane Library, IEEE, KMBase, KISS, KoreaMed, and RISS- for studies published up to December 2024. The eligible studies included randomized controlled trials, quasi-experimental, and observational studies involving older adults in hospitals or LTCFs. Two reviewers independently screened the studies, extracted data, and assessed their quality using standardized tools.

Results: Thirty-three studies comprising 20 fall detection systems and 13 fall prediction models were included. Detection systems using inertial, pressure, radar, or multimodal sensors have improved monitoring and achieved high usability (>80% acceptance); however, they did not consistently reduce fall incidence or the occurrence of injurious falls. For instance, one trial reported a nonsignificant reduction in injurious falls (aRR 0.56, 95% CI 0.17-1.79), whereas another trial observed a nonsignificant increase (aIRR 1.60, 95% CI 0.83-3.08). Frequent false alarms contribute to alarm fatigue. The prediction models showed moderate-to-strong discrimination. Gradient boosting and neural networks performed best for continuous gait features, while regression and boosting approaches were effective for categorical EHR data. Most models lacked external validation and were not linked to clinical care pathways.

Conclusions: Digital approaches show potential for fall prevention in hospitals and LTCFs; however, current evidence remains inconsistent and limited. Detection systems improve surveillance but offer limited preventive effects, whereas prediction models demonstrate technical promise without establishing clinical benefits. Future research should refine the technology, validate models externally, and integrate them into patient-centered workflows.

Keywords: digital health; fall detection and prediction; fall prevention; older adults; systematic review.

Home-Based Exercise and Fall Prevention in Older Adults: Development, Validation and Usability of the *Mais Equilíbrio* Mobile App

Leite MM, Silva AO, Funghetto SS, de Lima LR, Mezavila Abdelmur SB, Pinheiro HA, de Souza Silva CM, Dutra MT, Stival MM. JMIR Aging. 2025 Nov 4;8:e80724.

DOI: [10.2196/80724](https://doi.org/10.2196/80724)

PMID: 41187283

PMCID: [PMC12584999](https://pubmed.ncbi.nlm.nih.gov/41187283/)

Abstract

Background: The global aging population and the high incidence of falls among this population highlight the need for effective preventive strategies. Home-based exercise programs, such as the Otago protocol, have demonstrated efficacy in reducing fall risk but often face barriers related to user adherence. Mobile health (mHealth) apps offer promising tools to support health promotion and enhance autonomy in older adults.

Objective: This study aims to develop and validate a prototype mobile app, *Mais Equilíbrio* (More Balance), designed to guide older adults in performing home-based physical exercises adapted from the Otago protocol.

Methods: This methodological study was conducted in two phases: (1) content validation by 22 experts in physical education and physiotherapy using the Suitability Assessment of Materials (SAM) scale, and (2) usability testing with 24 older adults (aged 60 to 80 y), using the System Usability Scale (SUS). An overall score above 70% on the SAM and above 85 on the SUS were considered indicators of high quality and excellent usability, respectively.

Results: The *Mais Equilíbrio* (More Balance) app was developed based on the Otago protocol and tailored for independent home use. A Content Validity Index above 0.95 was observed for all items. An overall average score of 81.20 (SD 15.78) on the SAM scale was found, classifying the material as "superior." Usability tests with older adults showed an average score of 95.98 (SD 5.58) on the SUS, indicating excellent usability. The highest scores were observed in "ease of use" and "user confidence."

Conclusions: The *Mais Equilíbrio* (More Balance) app, distinct for digitally adapting the Otago protocol to the Brazilian context and for its dual validation process with experts and older adults, has proven to be a valid and highly usable tool for guiding home-based physical exercise in older adults, with potential to promote fall prevention and autonomy.

Keywords: elderly; fall prevention; mHealth interventions; mobile apps; older adults; physical exercise.

Activity of daily living impairment mediates the relationship between pain and falls in Chinese older adults: a cohort study

Li X, Liu R, Kang K, Tian G, Hao Y. BMC Geriatr. 2025 Nov 3;25(1):830.

DOI: [10.1186/s12877-025-06505-4](https://doi.org/10.1186/s12877-025-06505-4)

PMID: 41184855

PMCID: [PMC12581587](https://pubmed.ncbi.nlm.nih.gov/41184855/)

Abstract

Background: Falls impose a substantial disease burden on older adults, yet whether ADL impairment mediates the pain-falls pathway remains unclear. This study investigates whether ADL impairment acts as a mediator in the relationship between pain and incident falls among Chinese community-dwelling older adults.

Methods: We conducted a prospective cohort study using data from the China Health and Retirement Longitudinal Study (CHARLS) on respondents aged ≥ 60 years. Baseline and follow-up information was obtained through structured interviews. Logistic regression first quantified the pairwise associations among pain, ADL impairment, and falls. Subsequently, bootstrap-based mediation analysis was applied to test whether ADL impairment mediated the pain-falls relationship, restricting the model to variates that were significant in all three logistic regressions.

Results: A total of 6,280 participants was included in the analysis. Pain frequency (PF) (OR = 1.16, 95% CI: 1.10 to 1.22) and number of pain sites (NPS) (OR = 1.22, 95% CI: 1.13 to 1.31) were significantly associated with falls. PF (OR = 1.56, 95% CI: 1.49 to 1.63) and NPS (OR = 1.96, 95% CI: 1.83 to 2.11) were significantly associated with ADL impairment. ADL impairment was significantly associated with falls. Mediation analysis revealed that ADL impairment mediated the association between PF (mediation effect = $6.06e-03$, proportion = 22.47%) and falls, and between NPS (mediation effect = $1.10e-02$, proportion = 25.01%) and falls. Specifically, the mediating effect of impairments in dressing, bathing and toileting were significant.

Conclusion: Our study illuminates the mechanistic cascade from pain to falls via ADL impairment and offer concrete, modifiable targets for fall-prevention programs tailored to Chinese community-dwelling older adults. Coupling effective pain management with targeted support for dressing, bathing, and toileting is likely to curtail fall risk and enhance quality of life in older adults.

Keywords: Activity of daily living (ADL); Cohort study; Falls; Older adults; Pain.

Visual attention during non-immersive virtual reality balance training in older adults with mild to moderate cognitive impairment: an eye-tracking study

Maldonado-Díaz M, Jara-Vargas G, González-Seguel F. Front Aging Neurosci. 2025 Oct 21;17:1671477.

DOI: [10.3389/fnagi.2025.1671477](https://doi.org/10.3389/fnagi.2025.1671477)

PMID: 41195081

PMCID: [PMC12583179](https://pubmed.ncbi.nlm.nih.gov/41195081/)

Abstract

Background: Older adults with cognitive impairment often present with balance deficits, reduced walking speed, and attentional difficulties-particularly in executive function. These challenges increase fall risk and complicate traditional rehabilitation approaches. Eye-tracking technology offers an objective way to evaluate attention by analyzing oculomotor behavior during tasks, but its use in clinical rehabilitation contexts is still limited.

Objective: The aim of this study is to investigate visual attention using eye-tracking metrics during a non-immersive virtual reality-based balance training program in older adults with mild to moderate cognitive impairment.

Methods: This was an exploratory pilot study with a prospective, descriptive cohort, based on a non-controlled, quasi-experimental design of seven older adults with mild to moderate cognitive impairment. Each patient underwent VR-based balance training using Rehametrics® software, while their attention was assessed via eye-tracking (Tobii Pro TX300). Clinical assessments included the Mini-BESTest, Functional Gait Assessment, 6-Minute Walk Test, 4-Meter Walk Test, and Montreal Cognitive Assessment (MoCA). Eye-tracking data focused on fixation patterns, microsaccades, and pupil diameter as indicators of attentional processing.

Results: Patients showed a small numerical increase, without reaching statistical significance in task difficulty progression ($p = 0.016$), lower limb endurance ($p = 0.016$), and single-leg support time ($p = 0.031$). Clinical tests revealed a slight increase, though results were not statistically significant in balance and walking speed ($p = 0.063$). Eye-tracking data indicated increased fixation stability and decreased pupil diameter, suggesting more efficient attention allocation during motor tasks.

Conclusions: Eye-tracking provided valuable metrics into attentional behavior during balance training in older adults with cognitive impairment. Its integration into non-immersive virtual reality rehabilitation may help better understand and address cognitive-motor interactions. Further studies with larger samples are needed to confirm these preliminary findings.

Keywords: attention; balance training; cognitive impairment; eye-tracking; older adults; virtual reality.

Balance and Gait Disorders in the Aged Population. Causes, Assessment and Management: A Literature Review

Manckoundia P, Mourey F, Larosa F, Renoncourt T. Clin Interv Aging. 2025 Nov 11;20:1945-1962.

DOI: [10.2147/CIA.S531235](https://doi.org/10.2147/CIA.S531235)

PMID: 41246477

PMCID: [PMC12619612](https://pubmed.ncbi.nlm.nih.gov/41246477/)

Abstract

With aging, compensatory mechanisms and physiological reserve may become insufficient to maintain balance and gait (BG), particularly when associated with stroke, Alzheimer's disease, diabetes, osteoarticular disease, vestibular disorders, orthostatic hypotension (OH), heart rhythm disorders, or drug side effects. This leads to poorer postural-motor function and increased risk of falling (RoF). This review aims to highlight recent scientific advancements relative to BG disorders (BGDs) for gerontology professionals. When assessing older adults (OAs) with BGDs, a thorough assessment of patient history is needed to identify the origins. This should include the history of falls, an inventory of medications, and an analysis of the home environment. A comprehensive clinical examination is also required to guide etiological diagnoses. A clinical suspicion of cardiac arrhythmia/conduction disorders, for example, will be confirmed by electrocardiogram (ECG)/Holter ECG, whereas suspected OH (on questioning) will be confirmed by an OH test, and, in the presence of confusion, epilepsy will be confirmed by the electroencephalogram. Several tools, ranging from simple and quick to more complex and thorough, have been validated to evaluate BGDs in OAs. These tests involve activities of daily living tasks required to preserve independence. Emerging technologies for RoF assessment (ie, surface electromyography, force platforms, three-dimensional motion capture systems) while not yet used in routine geriatric practice, can improve early detection, monitoring, and rehabilitation. Optimal BGD management requires the implication of several health professionals. Rehabilitation programs such as the "Otago exercise programme" and "falls management exercise" have been validated. Assistive technologies (canes, walkers, grab bars, and orthopedic footwear or automated alert systems), and new technologies (virtual reality) can also be used. Additional steps include medication review and deprescribing, occupational therapy and home environment adaptations. Understanding and managing BGDs in OAs remains a major public health issue, and is vital for preserving independence in later life.

Keywords: balance; central nervous system; gait; older adult; posture.

Feasibility and outcome of the fewer falls in multiple sclerosis intervention: a pilot randomized controlled trial

Meijer U, Ytterberg C, Gottberg K, Piehl F, Flink M, Kierkegaard M. Sci Rep. 2025 Nov 18;15(1):40350.

DOI: [10.1038/s41598-025-27071-0](https://doi.org/10.1038/s41598-025-27071-0)

PMID: 41254032

PMCID: [PMC12627722](https://pubmed.ncbi.nlm.nih.gov/41254032/)

Abstract

Falls are common among people with multiple sclerosis (PwMS) and bring risk of both injury and reduced quality of life. The multifactorial background to risk of falls necessitates adapted and comprehensive interventions. The "Fewer Falls in MS" intervention is a manualized online self-management fall prevention programme designed for both ambulatory and non-ambulatory PwMS. We conducted a pilot trial to evaluate feasibility and outcome of the Fewer Falls in MS to determine whether to advance to a full-scale randomized controlled trial (RCT). In this two-armed parallel group study, 46 adult PwMS from across Sweden were randomized to the intervention (n = 23) or control (n = 23) group. The intervention included six 2-hour weekly online group sessions led by a trained group leader, followed by a booster session 8 weeks later. Both groups received a brochure on fall prevention. Falls were monitored weekly for 18 weeks via SMS. The evaluation demonstrates that participant recruitment and retention, data collection, intervention delivery, session adherence, and outcome measures were feasible. At the 18 weeks follow-up, results from the standardized questionnaires and falls data revealed no significant between-group differences. Furthermore, no adverse events were reported. Meeting all, but one, progression criteria justify proceeding to a full-scale RCT, with insights from this pilot trial being used to further refine the intervention and outcome measures.

Keywords: Digital health; Fall prevention; Neurological rehabilitation; Self-management.

Evaluating the Test-Retest Reliability of Five Low-Cost, Perturbation-Based Functional Tests for Balance Recovery in Older Adults

Melo-Alonso M, Leon-Llamas JL, Villafaina S, Fuentes-García JP, Domínguez-Muñoz FJ, Gusi N. Sports (Basel). 2025 Nov 3;13(11):375.

DOI: [10.3390/sports13110375](https://doi.org/10.3390/sports13110375)

PMID: 41295758

PMCID: [PMC12655952](https://pubmed.ncbi.nlm.nih.gov/41295758/)

Abstract

Background: Falls are a leading cause of injury and disability among older adults. Conventional clinical tests typically do not challenge reactive postural responses to unexpected perturbations, which limits their ability to comprehensively assess fall risk.

Objective: To examine the test-retest reliability of five pragmatic, low-cost, perturbation-based tests designed to identify compensatory stepping strategies in older adults, and to explore their concurrent validity against established clinical assessments.

Methods: Fifty-seven older adults (44 community-dwelling and 13 institutionalized) completed five compensatory stepping tests (obstacle crossing, forward push, backward pull, and lateral pulls to the right and left) and conventional functional tests [Timed Up and Go (TUG), 30 s Chair Stand, and the Short Physical Performance Battery (SPPB)] on two separate days, ten days apart. Cohen's weighted kappa (K_w) quantified test-retest reliability, and Pearson's correlation coefficients assessed relationships with conventional tests.

Results: Obstacle ($K_w = 0.443$), forward push ($K_w = 0.518$), and backward pull ($K_w = 0.438$) demonstrated moderate agreement overall. Lateral pull tests showed poor reliability. Nevertheless, moderate correlations were observed between some perturbation tests (particularly obstacle and backward pull) and standard clinical measures, especially TUG and SPPB.

Conclusions: Although reliability was limited-most notably for lateral perturbations-specific tests showed meaningful associations with validated functional assessments. Pending methodological refinements, these low-cost tools may offer useful insights for initial fall-risk screening.

Keywords: assessment; cognitive impairment; older adults; postural control; reproducibility.

Greater prefrontal cortical activation is associated with higher balance confidence in older adults

Min JY, Choi BY, Ryoo SW, Son SY, Ha SW, Cha J, Nam H, Choi J, Min KB. *Geroscience*. 2025 Nov 11.

DOI: [10.1007/s11357-025-02003-y](https://doi.org/10.1007/s11357-025-02003-y)

PMID: 41219663

Abstract

Fear of falling (FoF) is a prevalent and consequential concern among older adults, often associated with impaired mobility, cognitive decline, and reduced quality of life. Traditionally conceptualized as a psychological response to prior falls, FoF is increasingly recognized as a neurobehavioral phenomenon reflecting dysregulated cognitive-motor integration. In particular, the prefrontal cortex (PFC)-responsible for executive control, attentional regulation, and anticipatory motor planning-has emerged as a key neural substrate underlying FoF. This study investigated the association between PFC activation and balance confidence, a continuous correlate of FoF, in 308 community-dwelling older adults aged ≥ 60 years. Prefrontal oxygenated hemoglobin (HbO) was measured using functional near-infrared spectroscopy (fNIRS) during a verbal fluency task, a standardized cognitive paradigm eliciting PFC engagement without motor interference. Balance confidence was assessed using the validated Korean version of the Activities-specific Balance Confidence (ABC) scale. Subgroup analyses stratified by fall history, age, sex, and educational attainment were conducted to explore heterogeneity by known vulnerability factors. Higher regional HbO levels were significantly associated with higher ABC scores, reflecting greater balance confidence and lower FoF. This association was most pronounced in the right lateral and lower PFC regions (e.g., Right Lateral: $\beta = 1.41$, $p = 0.0062$; Lower Right: $\beta = 1.41$, $p = 0.0007$), and remained robust after adjusting for demographic and clinical covariates. Subgroup analyses revealed stronger associations among individuals with a history of falling, aged ≥ 75 years, women, and those with lower education. For example, in participants with prior falls, Right Hemisphere HbO was strongly correlated with ABC scores ($\beta = 2.06$, $p = 0.020$), suggesting greater cortical recruitment in response to heightened threat perception. We found that greater PFC activation was associated with higher balance confidence in older adults, particularly in those at elevated risk of falling. This relationship may reflect adaptive cortical engagement supporting postural assurance in vulnerable populations.

Keywords: Balance confidence; Elderly; Falling; Prefrontal cortex; fNIRS.

Barriers to reporting fear of falling and participation in fall prevention strategies among older adults in Pakistan: a qualitative study

Nazir S, Mathiyakom W, Tassawar MA, Tantisuwat A. BMC Geriatr. 2025 Nov 4;25(1):837.

DOI: [10.1186/s12877-025-06555-8](https://doi.org/10.1186/s12877-025-06555-8)

PMID: 41188749

PMCID: [PMC12584383](https://pubmed.ncbi.nlm.nih.gov/41188749/)

Abstract

Background: Falls are a major public health concern among older adults, causing injuries, disability, and reduced quality of life (QoL). Fear of falling (FoF) increases fall risk, yet barriers to reporting FoF and participating in fall prevention strategies (FPS) remain underexplored in culturally diverse and resource-limited settings like Pakistan.

Objective: This study aimed to explore the perceived barriers older adults faced in Pakistan in reporting FoF and engaging in FPS, providing insights for culturally sensitive interventions.

Methods: A qualitative descriptive study was conducted with 12 community-dwelling older adults (aged 65-80 years) recruited using non-probability purposive sampling. Data was collected through semi-structured interviews, transcribed verbatim, and analyzed using thematic analysis. Trustworthiness was ensured through member checking, data triangulation, and investigator triangulation.

Results: Three main themes emerged. First, FoF and communication-participants hesitated to disclose FoF due to stigma, fear of losing independence, or dismissal by healthcare providers (HCPs). Second, barriers and attitudes toward FPS-logistical challenges, health-related issues, and personal beliefs hindered participation in FPS. Third, support systems and recommendations-financial, motivational, and professional support were emphasized for engagement in FPS. Both groups recommended tailored, accessible FPS and enhanced communication about FoF.

Conclusion: Older adults in Pakistan face barriers to reporting FoF and participating in FPS. Culturally sensitive interventions with practical support, personalized care, and community resources are crucial. Findings emphasize the need for strategies to address barriers and enhance FPS participation in resource-limited settings.

Keywords: Communication challenges; Fall prevention strategies; Older adults; Perceived barriers.

Visual Dependence in Postural Control Is Increased in Older Adults

Neumann S, Mvomo C, Ravi DK, Schulte FA, Assländer L, Awai CE. Aging Dis. 2025 Nov 11. doi: 10.14336/AD.2025.1119.

DOI: [10.14336/AD.2025.1119](https://doi.org/10.14336/AD.2025.1119)

PMID: 41296932

Abstract

Successful postural control depends on the integration of visual, vestibular, and proprioceptive inputs. With age, postural control degrades, leading to impaired balance and greater fall risk. Understanding how this integration changes over the lifespan is invaluable for designing more effective interventions that enable healthy postural control in older age. Earlier studies measured visual dependence using perceptual tasks or spontaneous sway comparisons across visual conditions. This study evaluates how visual dependence differs between younger and older adults within the postural control mechanism using a Central Sensorimotor Integration (CSMI) test. Eighty healthy adults (n = 40, 60-87 years, n = 40, 21-52 years) were exposed to small pseudorandom visual scene movements implemented in virtual reality while standing on a compliant surface. Sway responses were measured using virtual reality trackers and interpreted using an established frequency domain balance control model. Model parameters included visual weight, proportional and derivative feedback gains, time delay, and torque feedback gain. Test-retest reliability was assessed in a subgroup (n = 40) and showed excellent intra-class correlation coefficients for visual weight, proportional and derivative feedback gains (ICC = 0.90-0.97), and lower ICCs for time delay (ICC = 0.60) and torque parameters (ICC = 0.30). The main difference between age groups was visual dependence, with older adults relying 40% on vision, compared to 33% for the younger group (p = 0.042). No significant group differences were found in other model parameters. The results provide direct evidence of an increase in visual contribution to posture control with age.

A Student-Led Telehealth Group Falls Prevention Exercise Program for Older Adults in a Rural Community: A Pilot Study

O'Connell C, Woodruffe S, Middleton K, Fallon AB, Rolf F, Walker C. Aust J Rural Health. 2025 Dec;33(6):e70109.

DOI: [10.1111/ajr.70109](https://doi.org/10.1111/ajr.70109)

PMID: 41277746

Abstract

Objective: This pilot study evaluated the feasibility and acceptability of a student-led group falls prevention exercise program delivered to a fixed hub via telehealth to older adults in a remote community.

Design: A convergent parallel mixed-methods design involving pre- and post-participation outcome measures, semi-structured focus groups and interviews explored the experiences and perspectives of participants completing the program and health professional students conducting the sessions.

Setting: Telehealth delivery to a very remote town (Modified Monash Model 7) in southwestern Queensland from a regional city in southeast Queensland.

Participants: Over 2022 and 2023, 17 community participants completed the program. Seven final year students, six studying exercise physiology and one studying physiotherapy, completed a clinical placement in a regional health and wellness clinic and implemented the telehealth program during their placement.

Results: Community participants demonstrated significant improvements in mobility and function following program participation, with higher BOOMER scores (M = 13.12, 95% CI 11.94-14.29) and faster 10-m walk times (M = 8.56 s, 95% CI 7.31-9.81) compared to baseline (M = 10.94, 95% CI 9.04-12.84; and M = 10.31 s, 95% CI 8.32-12.31, respectively). Clinically meaningful gains on the 10-m walk test were achieved by 64.7% of participants. Beyond physical outcomes, the program fostered valuable social connections. Health professional students reported increased awareness of effective telehealth strategies and growth in clinical skills as additional benefits.

Conclusions: Telehealth delivery of a group-based exercise program to a fixed hub appears to be a feasible and well-accepted model of rural health service delivery for both older adults and health students. Wider implementation of this approach to a broader range of health services could improve access to high-value care for rural and remote communities.

Keywords: clinical placement; falls prevention; rural and remote health; service learning; telehealth.

Older adults' long-term engagement in self-managed fall prevention exercise: a qualitative longitudinal study of the digital Safe Step intervention

Pettersson B, Lundell S, Audulv Å, Lundin-Olsson L, Sandlund M. BMC Geriatr. 2025 Nov 28. doi: 10.1186/s12877-025-06776-x. Epub ahead of print.

DOI: [10.1186/s12877-025-06776-x](https://doi.org/10.1186/s12877-025-06776-x)

PMID: 41315974

Abstract

Background: Falls among community-dwelling older adults can be significantly reduced through exercises for balance and strength. Digital solutions show promise in increasing the reach and promote adherence to fall prevention exercises among older adults. However, research on long-term engagement in self-managed fall prevention programs is lacking. The Safe Step application is designed, in collaboration with older adults, to motivate and support them in independently engaging in balance and strength exercises. The aim of this study was to explore longitudinal patterns of older adults' engagement in self-managed fall prevention exercise supported by the Safe Step digital application.

Methods: A qualitative longitudinal study was nested within a randomized controlled trial that evaluated the effectiveness of the Safe Step application in reducing falls among community-living older adults. A selection of participants who maintained an exercise dose of ≥ 60 min each week was invited to the study. Fifteen participants were included. Each participant was interviewed twice, first at the end of a twelve-month trial period and then after an additional six months. The analysis followed the Pattern-Oriented Longitudinal Analysis approach, analyzing patterns of change over time.

Results: Four engagement patterns were identified that began to emerge during the first year and were consolidated over time: (i) Coherent and sustained pattern, (ii) Coherent and episodic pattern, (iii) Integrated and sustained pattern, and (iv) Integrated and episodic pattern. The long-term engagement in self-managed digital fall prevention was characterized by the degree of cohesion and regularity in training. Initially, all participants followed the exercise recommendations provided by the application. With time they developed different strategies to maintain the exercises that resonated with their own preferences and daily activities.

Conclusions: The digital program played a meaningful role in initiating and establishing exercise routines, while other determinants also influenced long-term engagement strategies. Support for self-management of fall preventive exercise needs to evolve over time to meet the changing needs of individuals and their different patterns of exercise engagement. Further research is needed to inform digital interventions aimed at supporting long-term engagement in fall prevention programs.

Keywords: Aged; Behavior change; E-health; Exercise; Fall prevention; Longitudinal study; Qualitative research; Self-management.

Effectiveness of Nonslip Socks on Balance Control, Fear of Falling, and Prevention of Falls in Older Women at Home: A Parallel Randomized Controlled Trial

Razmjouie F, Ghoochani BZ, Ghahremani L, Asadollahi A. J Am Podiatr Med Assoc. 2025 Sep-Oct;115(5):23-173.

DOI: [10.7547/23-173](https://doi.org/10.7547/23-173)

PMID: 41166126

Abstract

Background: A widespread effect of aging is imbalance and risk of falling with inappropriate footwear, which currently does not have an effective solution for older adults at home. We investigated the effect of nonslip socks on maintaining balance and preventing falls in aging women at home.

Methods: This study was a parallel controlled trial with 42 older adults from Farzanegan Daily Caring Foundation of south Iran-Shiraz. The sample size was divided into six equal groups: two control groups and four intervention groups. The intervention groups used four models of nonslip socks, and the control groups consisted of older people with bare feet and sandals. Balance was measured using the Timed Up and Go test and the nine-item Berg Balance Scale, and fear of falling with the Falls Efficacy Scale International in two phases before and after the intervention.

Results: NOVA nonslip socks reduced fear of falling by 19% ($\omega^2 = 0.1903$) and had the highest percentage of effectiveness (Cohen's $d = 2.11$, Glass's $\delta = 2.54$, and Cohen's $U3 = 84.8\%$; $P < .05$). Coco nonslip socks had a 22.5% increase in Berg Balance Scale score ($\omega^2 = 0.2257$) and the highest effect percentage (Cohen's $d = 2.04$, Glass's $\delta = 1.72$, and Cohen's $U3 = 100\%$; $P < .05$). ANIPA nonslip socks had a 2.8% increase in back and forth balance ($\omega^2 = 0.0288$) and the highest percentage of effectiveness (Cohen's $d = 2.00$, Glass's $\delta = 2.18$, and Cohen's $U3 = 99.5\%$; $P < .05$). But nonslip socks could not have an acceptable effect on the number of falls ($\omega^2 = -0.0003$; $P > .05$).

Conclusions: These results show that nonslip socks improved balance and walking more than sandals and bare feet.

Fall prevention indicator priorities for public health and across health sectors in Ontario: a comparative study

Richmond SA, Medeiros A, Pike I, Oakey M, Macpherson AK. BMC Geriatr. 2025 Nov 3;25(1):832.

DOI: [10.1186/s12877-025-05693-3](https://doi.org/10.1186/s12877-025-05693-3)

PMID: 41184759

PMCID: [PMC12581391](https://pubmed.ncbi.nlm.nih.gov/41184759/)

Abstract

Introduction: Falls are the leading cause of injury-related emergency department (ED) visits and hospital admissions among older adults across many provinces in Canada. To effectively address this burden requires relevant data and indicators to inform fall prevention planning and evaluation for practitioners across the spectrum of prevention.

Methods: We used a modified Delphi approach, including an environmental scan, survey and pairwise comparison exercise to identify, refine and prioritize older adult fall prevention indicators across multiple health sectors in Ontario and specifically for public health. Three iterative phases of consultation were conducted with practitioners, as well as experts in injury prevention indicator development.

Results: The prioritization exercise resulted in differing priorities between multiple sectors and public health. The highest ranked indicator for multiple sectors was the rate of ED visits, and the lowest was disability-adjusted life years due to a fall. For public health, the rate of hospitalizations due to a fall was ranked first, with the rate of mortality due to a fall last. The remainder of the list differs considerably by group, with certain indicators ranked on one list, but not the other.

Conclusion: This work identified, refined and prioritized indicators for older adult fall prevention across health sectors and for public health in Ontario. While both groups shared some highly ranked indicators, their differing responsibilities in fall prevention are reflected in the contents and order of their respective priorities for indicators. Delineating the unique data needs of each group highlights the importance of having consistent and actionable data that informs prevention planning and evaluation.

Keywords: Indicators; Injury prevention.

Implementability of a co-designed programme to increase tailored exercise to reduce falls in older people from culturally and linguistically diverse communities: protocol for a pilot randomised controlled trial

Said CM, Ramage ER, Sharma H, Batchelor F, Bicknell E, Bongiovanni L, Brijnath B, Cahill P, Callisaya M, Celestino S, Chudecka A, Engel L, Lim WK, McDonald CE, Pinheiro M, Sherrington C, Vogrin S, Zanker J, Zheng C, Klaic M; MOVE Together: Reduce Falls Collaboration. *BMJ Open*. 2025 Nov 19;15(11):e105995.

DOI: [10.1136/bmjopen-2025-105995](https://doi.org/10.1136/bmjopen-2025-105995)

PMID: 41263897

PMCID: [PMC12636880](https://pubmed.ncbi.nlm.nih.gov/41263897/)

Abstract

Introduction: Falls are a critical problem for older people, including those from ethnically diverse communities, who are under-represented in research. The aim of this pilot trial is to evaluate (1) the implementability of a co-designed intervention developed to support the sustained uptake of tailored exercise to reduce falls (*MOVE Together: Reduce Falls*) and (2) the feasibility of conducting a randomised controlled trial (RCT) in older people from Italian, Arabic, Cantonese or Mandarin-speaking communities.

Methods and analysis: Investigator and assessor-blinded pilot two-arm parallel RCT. 60 older people at risk of falls from Italian, Arabic, Cantonese or Mandarin speaking communities will be recruited, with the option to enrol on their own or with another participant (dyad). Participants or dyads will be randomly assigned to the experimental or control arm. The experimental arm will receive *MOVE Together: Reduce Falls*, which provides up to 12 sessions with a physiotherapist over 12 months and supports participants to engage in individualised exercises. Both arms will receive educational resources in the participant's preferred language. The primary outcome is implementability of the co-designed intervention, *MOVE Together: Reduce Falls*; operationalised as fidelity (>70% of intended sessions delivered), feasibility (> 95% of sessions delivered with no serious adverse events related or likely related to the intervention) and acceptability (>50% acceptability score). The secondary outcome is feasibility of the RCT protocol, which will be evaluated quantitatively (eg, recruitment and retention rates, completion of clinical outcome data including prospective collection of falls data for 12 months via falls calendars) and qualitatively (eg, barriers and enablers to data collection).

Ethics and dissemination: Ethical approval has been granted for this study (HREC/106010/MH-2024). Study findings will be published in peer-reviewed journals and presented at relevant conferences and community forums.

Trial registration number: ACTRN12624000658516.

Keywords: Exercise; GERIATRIC MEDICINE; Primary Prevention; REHABILITATION MEDICINE.

Factors Associated with Falls in Older Adults: A Retrospective Hospital-Based Study Using Comprehensive Geriatric Assessment in Thailand (2020-2023)

Saokhieo P, Pliannuom S, Vidhayakula N, Tavivadhanasubhakij I, Promprasit T, Dissai P, Pinyopornpanish K. J Prim Care Community Health. 2025 Jan-Dec;16:21501319251385068.

DOI: [10.1177/21501319251385068](https://doi.org/10.1177/21501319251385068)

PMID: 41230606

PMCID: [PMC12615917](https://pubmed.ncbi.nlm.nih.gov/41230606/)

Abstract

Background: Falls are a leading cause of injury and disability in older adults, significantly impacting their quality of life. Identifying fall-related factors through comprehensive geriatric assessment (CGA) offers valuable insights into fall prevention strategies. This study aimed to explore factors associated with falls from CGA among older adults in Thailand.

Methods: A retrospective cross-sectional study was conducted among older adults aged 60 years and older attending a geriatric clinic, Thailand between October 2020 and October 2023. Data were collected from electronic medical records, including personal information and CGA data (physical, psychological, and functional). The fall assessment was conducted on the same day by simply asking, "Have you ever fallen in the past year?". The answer yes indicates a faller. Univariable and multivariable logistic regression analyses were performed to identify factors associated with falls.

Results: Out of the 338 older adults, 96 (28.4%) reported a history of falls, 223 (65.98%) were older females, with a mean age of 69.76 ± 6.70 years. Significant factors of falls included advancing age (mOR 2.49, 95% CI 1.08-5.76, P -value = .033), female (mOR 1.92, 95% CI 1.02-3.61, P -value = .043), body mass index (BMI; mOR 0.92, 95% CI 0.85-0.99, P -value = .031), knee osteoarthritis (mOR 1.76, 95% CI 1.01-3.08, P -value = .045), and positive 2Q (mOR 0.33, 95% CI 0.11-0.99, P -value = .048).

Conclusion: This study identified several CGA-derived factors-such as advanced age, female sex, lower BMI, knee osteoarthritis, and depression- that were associated with falls in older adults. These findings highlight the importance of integrating CGA into routine geriatric care to identify high-risk individuals and to inform targeted fall-prevention strategies in hospital settings.

Keywords: aging population; comprehensive geriatric assessment (CGA); falls; older adults; risk factors.

Effects of resistance and agility training on fall risk in patients with osteoporosis - A comparative study

Savaliya B, Kumar A. J Bodyw Mov Ther. 2025 Dec;45:93-98.

DOI: [10.1016/j.jbmt.2025.05.006](https://doi.org/10.1016/j.jbmt.2025.05.006)

PMID: 41316667

Abstract

Context: Osteoporosis is a bone disease that causes the bones to become less mineralized and brittle. Fractures may result from bone thinning, particularly in the wrist, hip, and spine.

Aim: The goal of the current study was to contrast the effects of resistance training and agility training on individuals with osteoporosis' risk of falling.

Settings: and Design: A comparative study was conducted at the Venus Institute of Physiotherapy Outpatient department.

Subjects: and Methods: 45 patients with osteoporosis were enrolled in the trial and randomly split into two groups. For eight weeks, or three sessions per week, Group A received resistance training, and Group B received agility training. Both the Timed Up and Go test (TUG) and the Berg Balance Scale (BBS) were used to assess fall risk prior to and during therapy. Statistical Evaluation t-test analysis was performed using the Windows version 20 of the SPSS program. We estimated the mean and standard deviation. Statistical significance was set at P 0.05.

Result: A total of 40 participants-20 from Group A and 20 from Group B-completed the study. Both groups showed a statistically significant decrease in fall risk for the TUG test (P0.05) and BBS score (P0.05). Compared to the agility training group, resistance training reduced the risk of falling more.

Conclusions: According to the study, an 8-week resistance training program reduces the chance of falling more effectively than an agility training program.

Keywords: Agility training; Exercise; Fall risk; Osteoporosis; Resistance training.

Conventional and tablet-supported physical training to reduce falls and fall-related injuries in community-dwelling older adults: protocol of the randomised SURE-footed into the future Fall Intervention Trial (SURE-FIT)

Schoene D, Gross M, Finger B, Lahmann NA, Raeder K, Vorweg-Gall S, König HH, Grochtdreis T, Stöger D, Handschuh A, Unseld T, Rothenbacher D, Büchele G, Rapp K. *BMJ Open*. 2025 Nov 28;15(11):e105969.

DOI: [10.1136/bmjopen-2025-105969](https://doi.org/10.1136/bmjopen-2025-105969)

PMID: 41314827

Abstract

Introduction: Exercise-based interventions are well-established in reducing falls and fall-related injuries, but adherence and accessibility remain key challenges, particularly in rural areas. While conventional in-person training is widely used, digital interventions may offer scalable solutions to enhance engagement and reach. However, pragmatic trials evaluating the real-world effectiveness of conventional and digitally supported fall prevention interventions are lacking, limiting the evidence base for their implementation in routine healthcare settings. The SURE-Footed into the Future Fall Intervention Trial (SURE-FIT) aims to compare the effectiveness of two structured fall prevention interventions—a conventional centre-based exercise programme and a hybrid telemedical programme combining in-person and tablet-supported training—against a wait-list control group in reducing falls and fall-related injuries among community-dwelling older adults.

Methods and analysis: This study is a pragmatic three-arm, parallel-group, randomised controlled superiority trial with a 1:1:1 allocation ratio. Participants (≥ 65 years, community-dwelling, planned $n=2778$) will be randomly assigned to (1) conventional centre-based training supplemented with printed materials for home-based continuation (conventional group), (2) a hybrid model integrating centre-based and tablet-supported training for continuation (tablet group) or (3) a wait-list control group. The intervention includes a 9-week supervised phase followed by 43 weeks of independent home-based training. The primary outcomes are the incidence rate of falls and fall-related injuries over 12 months. Secondary outcomes include physical functioning, physical activity, concerns about falling, loneliness and the risk of low protein intake. A process evaluation will assess intervention feasibility and implementation. Additionally, qualitative interviews will be conducted with participants, course instructors and municipal stakeholders to explore experiences, facilitators and challenges related to programme participation and implementation. A health-economic evaluation will be conducted to assess the cost-effectiveness of the structured fall prevention interventions. Data collection will take place at baseline and every 3 months via standardised questionnaires, with a subgroup undergoing physical performance testing and sensor-based activity monitoring. Analyses will follow an intention-to-treat approach.

Ethics and dissemination: Ethical approval has been granted by the Ethics Committee of Ulm University (271/23). Written informed consent will be obtained from all participants before enrolment. Study findings will be disseminated through peer-reviewed publications, scientific conferences and national fall prevention initiatives. Additionally, results will be shared with key municipal representatives, and the German National Association of Senior Citizens' Organisations (BAGSO). A publicly accessible website will provide ongoing access to study information and findings in plain language.

Trial registration number: DRKS00032878, German Clinical Trials Register.

Keywords: Aged; Exercise; PREVENTIVE MEDICINE; Telemedicine; Trauma; accidental falls; community-dwelling; fall prevention; functional capacity; mobility.

A randomized control trial comparing Falls Reduction for Elderly Emergency Department (FREED) interventions and usual care

Sri-On J, Pongvirat K, Rujichanantakul S, Nithimathachoke A, Pholphijit T, Fusakul Y, Liu SW. BMC Emerg Med. 2025 Nov 6;25(1):224.

DOI: [10.1186/s12873-025-01383-w](https://doi.org/10.1186/s12873-025-01383-w)

PMID: 41199222

PMCID: [PMC12590704](https://pubmed.ncbi.nlm.nih.gov/PMC12590704/)

Abstract

Background: This study evaluated the effectiveness of a Falls Reduction for Elderly Emergency Department (FREED) intervention in reducing recurrent falls among older adults presenting to the emergency department (ED) after a fall at 6 months.

Methods: This randomized controlled trial conducted in an ED in Bangkok, Thailand, included patients aged ≥ 60 years who had experienced a fall in the previous 7 days. The patients were randomized to receive the FREED intervention or usual care, including a systematic fall risk assessment, medication review, vitamin D supplementation, physical therapy referrals, and home environment assessment. The primary outcomes analysis included the intention-to-treat (ITT) and per-protocol (PP) analyses.

Results: After excluding 1,026 ineligible individuals, 216 patients (median age: 75 [interquartile range: 69-81] years) were enrolled, 108 in the FREED intervention and 108 in the usual care arm. Six-month follow-up data were available for 97% of the participants. The intergroup difference in repeated falls (primary result) was not significant (intervention group: 20.4%, control group: 25.0%; the observed absolute risk reduction of 4.6% was not statistically significant (95% confidence interval: -15.8% to 6.5%, $p = 0.42$). At 6 months, activities of daily living (ADL) scores decreased very slightly in both groups, with no between-group differences.

Conclusion: The FREED intervention was feasible and acceptable among older ED patients who had fallen but did not significantly reduce repeated falls at 6 months. Fall prevention in the ED can be challenging, and multicenter studies with longer follow-up periods are required to further explore the impact of ED-initiated fall prevention interventions.

Clinical trial number: TCTR20180522002.

Trial registration: The trial was registered in the Thai Clinical Trial Register on 22 May 2018.

Keywords: Emergency department; Fall; Older adult.

Commentary on NICE guidance 249-falls: assessment and prevention in older people and in people 50 and over at higher risk

Vandervelde S, Skelton DA, Milisen K, Treml J, Martin FC. Age Ageing. 2025 Oct 30;54(11):afaf322.

DOI: [10.1093/ageing/afaf322](https://doi.org/10.1093/ageing/afaf322)

PMID: 41206101

Abstract

The new National Institute for Health and Care Excellence (NICE) Falls Guideline (NG249) updates CG161 (2013). NG249 aims to reduce the risk and incidence of falls, associated clinical consequences and loss of confidence or independence. The scope has expanded to include people aged 50-64 at higher risk of falls, identified by their medical condition and people in hospital or residential care. The intended audience includes health, social care and local authority commissioners and practitioners, care home providers and people at risk of falls. The Quality Standards (QS86) have been updated and simplified. The 39 recommendations on identifying people at risk, comprehensive falls risks assessment, interventions, maximising participation, information and education, are intended to be feasible and cost-effective in the UK national health and care system. Risk assessment tools are not recommended in any setting; however, a welcome change is tiered intervention responses dependent on initial risk assessment, which roughly aligns to the World Falls Guidelines. Will NG249 generate new actions to reduce population falls rates? Two aspects suggest perhaps not. The general description of recommended exercise is not strengthened with details on dose and lacks a clear statement discouraging low intensity/untargeted exercise; such programmes are likely more prevalent than those based on level one evidence. Linked to this, the guidance statement that most recommendations, including exercise, have no cost implications as they reflect current practice is highly contestable. With no reliable audit data and much anecdotal evidence to refute it, the danger is that commissioners and funders will see no case for review or reinvestment. An opportunity lost?

Keywords: exercise; falls prevention; guidelines; implementation; interventions; older people.

Effectiveness of an improved fall risk assessment form combined with obstacle physical activity testing in preventing falls in older adults hospitalized patients

Wang X, Li W, Zheng M, Li C, Liang R, Yao S, Liu X, Zhang X, Di X, Lu Y. Front Public Health. 2025 Oct 28;13:1601666.

DOI: [10.3389/fpubh.2025.1601666](https://doi.org/10.3389/fpubh.2025.1601666)

PMID: 41229466

PMCID: [PMC12602510](https://pubmed.ncbi.nlm.nih.gov/41229466/)

Abstract

Objective: This study aimed to evaluate the effectiveness of personalized preventive interventions guided by an improved Risk Assessment Form and an obstacle physical activity test in preventing falls among older adults hospitalized patients.

Method: A single-center, randomized controlled trial was conducted with 320 older adults hospitalized patients (mean age 76.4 ± 6.8 years), who were allocated to either an experimental group ($n = 160$) or a control group ($n = 160$). The experimental group received a comprehensive fall risk assessment using an improved form and an obstacle activity test, which subsequently guided personalized prevention measures. The control group was assessed using traditional hospital fall risk screening methods and received standard fall prevention care. The primary outcome was the incidence of falls. Secondary outcomes included injury severity, nursing satisfaction, patient compliance, physical activity improvement, and quality of life. Key areas for process improvement were identified using Failure Mode and Effects Analysis (FMEA).

Result: The experimental group had a significantly lower fall incidence (8.13%) compared to the control group (28.13%). The experimental group also experienced a lower severity of injuries, with a higher proportion of soft tissue injuries and a lower proportion of fractures. Nursing satisfaction, patient compliance rates, physical activity improvement, and quality of life scores were all significantly higher in the experimental group compared to the control group. FMEA identified that failure to implement preventive measures consistently was the highest-risk failure mode in the fall prevention process.

Conclusion: The application of personalized fall prevention strategies guided by a comprehensive assessment that combines a multidimensional risk form with a dynamic obstacle physical activity test is effective in reducing falls and injury severity among older adults hospitalized patients. This approach also enhances patient satisfaction, compliance, and quality of life, and is recommended for broader implementation in inpatient settings.

Keywords: fall prevention; fall risk assessment; falls; obstacle physical activity ability test; older adults hospitalized patients; patient safety.

Association between modified Rankin Scale scores and fall risk in post-stroke rehabilitation inpatients: a cross-sectional study

Wu S, Zhang Q, Yan J, Long J, Hou D, Wang Y. Sci Rep. 2025 Nov 13;15(1):39820.

DOI: [10.1038/s41598-025-23463-4](https://doi.org/10.1038/s41598-025-23463-4)

PMID: 41233411

PMCID: [PMC12615644](https://pubmed.ncbi.nlm.nih.gov/41233411/)

Abstract

Falls are among the most common complications after stroke, potentially delaying functional recovery. Although the modified Rankin Scale (mRS) is widely used in stroke assessment, its relationship with fall risk remains poorly understood. The study aims to identify the association between mRS scores and fall risk in stroke patients. In this multicenter cross-sectional study, data on sociodemographics, clinical factors, fall characteristics, and mRS scores were collected via face-to-face interviews. Univariate analysis, binary logistic regression, and threshold effect models were employed to examine the association between fall risk and mRS scores. Among 6,192 enrolled patients, 524 (8.46%) experienced falls. The mRS showed a non-linear association with fall risk, peaking at mRS = 3 ($P < 0.05$). For scores < 3 , each 1-point increase in mRS raised fall risk by 34% (OR = 1.32, 95% CI: 1.09- 1.60, $P = 0.0046$), whereas for scores > 3 , each 1-point increase reduced risk by 26% (OR = 0.74, 95% CI: 0.61-0.90, $P = 0.0027$). An inverted U-shaped relationship exists between mRS scores and fall risk, peaking at an mRS score of 3, identifying a potential priority group for fall prevention.

Keywords: Cross-sectional study; Fall risk; Functional impairment; Modified rankin scale; Stroke.

Student-run falls prevention programmes for older adult community members: a pilot study

Yap J, Broman P, Longhurst G, Brownie S. J Prim Health Care. 2025 Sep 19;17(3):276-280.

DOI: [10.1071/HC24057](https://doi.org/10.1071/HC24057)

PMID: 41145137

Abstract

Introduction: Falls among community-dwelling older adults represent a significant public health concern. A student-led falls prevention initiative was piloted with a group of at-risk clients in Hamilton/Waikato, New Zealand.

Aim: The aim of this study was to evaluate a student-led falls prevention programme from the perspective of a group of initial clients. The programme comprises two key components: strength and balance exercises, and sessions providing falls prevention education (FPE) from the perspective of a group of initial clients.

Methods: Data on perceived effectiveness and overall impact were collected via a post-programme survey.

Results: Participants reported positive perceptions of the programme's effectiveness in enhancing knowledge and preventing falls. Qualitative data revealed multifaceted benefits experienced by participants, indicating the potential efficacy of student-led initiatives in reducing falls among older adults.

Discussion: These initial findings underscore the potential of student-led initiatives in addressing falls prevention and enhancing the wellbeing and safety of aging populations. Further research is warranted to explore the scalability and sustainability of such programmes in broader community settings.

Keywords: Aotearoa New Zealand; falls; interprofessional education; pilot study; prevention health programmes; primary health care; public health; student-run clinic.