Featured Falls Research – June

Virtual Reality Intervention for Fall Prevention in Older Adults: A Meta-Analysis

Saragih ID, Chen YM, Suarilah I, Susanto H, Lee BO. J Nurs Scholarsh. 2025 Jun 18.

DOI: 10.1111/jnu.70028 **PMID:** 40533914

Abstract

Purpose: Falls among older adults are a major public health concern, often leading to serious outcomes such as fractures, head trauma, and increased mortality. Virtual reality (VR) interventions have emerged as a promising strategy for fall prevention by improving balance, reducing fear of falling, and enhancing confidence. However, the impact of VR interventions on specific outcomes such as fear of falling, balance, and postural control in older adults remains insufficiently synthesized.

Design: Systematic review and meta-analysis.

Methods: A comprehensive systematic search of six databases was conducted from inception to January 20, 2025. Randomized controlled trials (RCTs) evaluating VR interventions targeting fear of falling, balance, and postural control in older adults were included. Methodological quality was assessed using the Cochrane risk-of-bias tool (RoB-2). Pooled standardized mean differences (SMDs) with 95% confidence intervals (CIs) were calculated using random-effects models for each outcome.

Findings: Seventeen RCTs involving 988 older adults, published between 2016 and 2025, met the inclusion criteria. VR interventions demonstrated significant effects in reducing fear of falling (SMD = -0.40; 95% CI: -0.72 to -0.08; I2 = 45.10%; p = 0.02), improving balance (SMD = 0.45; 95% CI: 0.07-0.83; I2 = 73.54%; p = 0.02), and enhancing postural control (SMD = 0.50; 95% CI: 0.13-0.86; I2 = 46.89%; p = 0.01).

Conclusion: This meta-analysis highlights the effectiveness of VR interventions in reducing fear of falling and improving balance and postural control among older adults.

Clinical relevance: VR represents a valuable tool in fall prevention strategies, addressing key outcomes essential for maintaining independence and mobility in this population.

Keywords: fall prevention; fear of falling; meta-analysis; older adults; virtual reality.

Falls Research – June

Task difficulty modulates motor learning benefits of balance exercises in community-dwelling older adults

Akizuki K, Takeuchi K, Yamaguchi K, Yamamoto R, Nakano W, Yabuki J. Exp Gerontol. 2025 Jun 19:208:112816.

DOI: 10.1016/j.exger.2025.112816 **PMID:** 40543830

Abstract

Purpose: Balance disorders are a major modifiable risk factor for falls, and balance exercises reduce fall rates. However, the effectiveness of balance exercises may depend on the relationship between the task difficulty and individual skill levels. This study aimed to explore the impact of task difficulty on the motor learning benefits of balance exercises.

Methods: A sex-stratified, randomized, and non-blinded study was conducted among 40 community-dwelling older adults assigned to either a low- or high-difficulty balance exercise group. The task difficulty was manipulated by altering the support component affixed to an unstable board. Balance performance was measured using a stability index, and functional task difficulty was assessed using the National Aeronautics and Space Administration Task Load Index (NASA-TLX). The experiment included a pre-test, practice trials, and post-test conducted 24 h later. Statistical analyses included analysis of variance and regression analyses to examine the impact of task difficulty on motor learning and the relationship between motor learning benefits and task difficulty.

Results: While both groups showed improved balance performance with practice, the low-difficulty group demonstrated greater motor learning benefits at the 24-h post-test ($p < 0.001$). Regression analysis showed a curvilinear relationship between the performance dimension score of the NASA-TLX and motor learning benefits ($y = -0.017x^2 + 1.843x - 26.711$, adjusted $R^2 = 0.380$, $p < 0.001$).

Conclusion: In balance exercises for community-dwelling older adults, task difficulty significantly influences exercise intervention effectiveness. Our findings contribute to the development of personalized fall prevention programs that adjust task difficulty according to individual skill levels.

Keywords: Balance exercises; Falls prevention; Mental workload; Motor learning; Older adults; Task difficulty.

Cognition, fear, and falls: psychological predictors of balance impairment in community-dwelling older adults

Alkhamis BA, Elrefaey BH, Almohiza MA, Alahmari KA, Alshahrani MS, Alnakhli HH, Koura G, Mukherjee D, Kardm SM, Alyazedi FM, Reddy RS. Front Psychiatry. 2025 Jun 3:16:1610894.

DOI: 10.3389/fpsyt.2025.1610894 **PMID:** 40530055 **PMCID:** PMC12170642

Abstract

Objective: This study aimed to (1) assess the associations among cognitive function, fear of falling, and balance in community-dwelling older adults; (2) identify key predictors of balance performance; and (3) examine implications for fall prevention strategies.

Methods: Eighty-four older adults (≥65 years) residing independently in the community were recruited during outpatient visits. Cognitive function was assessed using the Saint Louis University Mental Status (SLUMS), fear of falling was measured with the Falls Efficacy Scale-International (FES-I), and balance performance was evaluated using the Berg Balance Scale (BBS). Physical activity, demographic factors, and fall history were also recorded.

Results: Bivariate correlations showed that higher cognitive function was associated with better balance ($r = 0.45$, $p = 0.014$), while greater fear of falling was linked to poorer balance ($r = -0.52$, $p = 0.003$). A hierarchical regression model revealed that cognitive function ($\beta = 0.32$, $p = 0.002$) and fear of falling ($\beta = -0.44$, $p < 0.001$) were significant predictors of balance performance, even after controlling for age, gender, physical activity, and fall history. Exploratory logistic regression showed that fear of falling (OR = 1.12, $p = 0.002$) and balance performance (OR = 0.91, $p = 0.008$) were significant predictors of fall history.

Conclusion: Cognitive function and fear of falling are independent and meaningful predictors of balance performance in older adults. These findings support the integration of cognitive and psychological assessments into exercise-based fall prevention strategies.

Keywords: balance performance; cognitive function; fall prevention; fear of falling; older adult; physical therapy.

Effectiveness, enjoyment, and meaningfulness of a virtual reality gait-based fall prevention exergame in community-dwelling healthy older adults: an interdisciplinary pilot study

Ciemer C, Schott N, Klotzbier TJ, Ghellal S. Front Psychol. 2025 Jun 3:16:1610377.

DOI: 10.3389/fpsyg.2025.1610377 **PMID:** 40567879 **PMCID:** PMC12188472

Abstract

Introduction: Falls are a prevalent health concern among older adults, potentially resulting in substantial physical, psychological, and social ramifications. Interventions aimed at fall prevention require effectiveness, enjoyment, and meaningfulness (EEM). As gait impairments are a key factor in fall risk, integrating natural locomotion and cognitive skills through single- and dual-task training is essential. We developed *EXploVR*, a fully immersive virtual reality exergame that integrates natural gait and promotes EEM. This interdisciplinary pilot study examined the EEM of *EXploVR* in healthy, community-dwelling older adults.

Methods: Forty-six participants were assigned to an intervention or passive control group using a single-blinded, quasi-randomized design. Over three weeks, the intervention group completed two 60-min sessions weekly. Baseline, mid-, and post-assessments included single- and dual-task gait (instrumented normal and tandem walks, counting task), lower limb strength and transitional movement (instrumented Five Times Sit-to-Stand test, 5xSTS), and static postural control (instrumented sway tests). In-game performance (time-to-complete) was recorded. Enjoyment was assessed via the Flow Short Scale (FKS), Physical Activity Enjoyment Scale (PACES-S) and adaptations, and Exergame Enjoyment Questionnaire (EEQ). Meaningfulness was assessed via the Activities-specific Balance Confidence Scales (ABC-6, ABC-8) and custom questions on perceived safety, fear of falling, daily-life integration, emotional challenges, and perceived effectiveness for fall prevention.

Results: Data from 32 participants (16 intervention, age = 70.00 ± 3.33 years; 16 control, age = 68.38 ± 5.54 years) were analyzed. Significant improvements were found in walking gait speed ($p = 0.019$) and tandem gait speed ($p = 0.032$). Under dual-task conditions, only tandem gait speed improved significantly ($p = 0.022$). 5xSTS showed a significant interaction for total duration ($p = 0.023$), while postural sway demonstrated non-significant improvement trends. In-game station completion time improved significantly in 5 of 6 sets ($p < 0.05$). Enjoyment remained high or increased, and meaningfulness was supported by positive trends in ABC-6 ($p = 0.094$) and significant gains for ABC-8 ($p = 0.026$). Custom questions further supported these findings.

Conclusion: This study suggests that EXploVR is effective and enjoyable while fostering meaningfulness. Further research with larger samples and extended interventions is needed to confirm long-term effects and daily-life transfer.

Keywords: accidental falls; exergaming; fall prevention; game design; human movement science; interdisciplinary research; user experience; virtual reality.

Innovative approaches to fall prevention in community-dwelling older adults

Delbaere K, Sherrington C, Said CM, Naganathan V. Med J Aust. 2025 Jun 24.

DOI: 10.5694/mja2.52714 **PMID:** 40556322

Abstract

No abstract available

Keywords: Accident prevention; Exercise therapy; Falls.

'It's Common Sense': Older Adults' Personal Strategies to Prevent Falls in the Hospital. A Qualitative Descriptive Study

Dolan H, Daniels A, Coon DW. J Clin Nurs. 2025 Jun 20.

DOI: 10.1111/jocn.70018 **PMID:** 40541568

Abstract

Aims: The purpose of this study was to describe the strategies older adults use to maintain their balance and prevent themselves from falling in the hospital.

Design: The Expanded Health Belief Model served as the theoretical framework for this qualitative descriptive study.

Methods: Audio-recorded, semi-structured interviews were conducted with 15 (N = 15) older adults (female 53.3%), mean age of 77 (SD 9.9) admitted to a rural community hospital in the United States. Each transcript was analysed independently by two researchers using content analysis before reaching consensus. Sample size was guided by thematic saturation. Trustworthiness was ensured by using the criteria outlined by Lincoln and Guba.

Results: Four main themes emerged: My Balance Problem is My Personal Responsibility, Self-efficacious Common-Sense Balance Management Strategies, Hospital Staff as Contributors or Disruptors of My Balance Management, and My Needs for Balance Management Support. The older adults used extensive mental efforts in planning and executing personal strategies to maintain balance and viewed this as their personal responsibility. Their self-efficacious balance management strategies included observing the environment, assessing furniture and equipment, staying focused, and moving slowly. Assistance from hospital staff members either supported or disrupted the older adults' balance management efforts. The older adults desired to learn more about fall prevention in the hospital. The older adults found physical guidance, demonstration and verbal guidance to be the preferred method of learning.

Conclusion: Rurally hospitalised older adults employ independent, self-efficacious balance management strategies.

Implications: Older adults' personal balance management strategies must be recognised by healthcare workers.

Impact: Future inpatient fall prevention interventions and policies must focus on exploring hospitalised older adults' optimal and suboptimal balance management behaviours to develop patient-centred fall prevention interventions to decrease inpatient falls among older adults.

Reporting method: The Consolidated Criteria for Reporting Qualitative Research.

Patient or public contribution: No patient or public contribution.

Keywords: acute care; balance perceptions; expanded health belief model; fall prevention; hospital; older adults; qualitative.

A Qualitative Analysis of a Digital Fall Prevention Exercise Program for Older Adults With Increased Fall Risk

Farrell S, Bajdek N, Dishaw M, Garabedian P, Williams A, Hachen N, Valderrábano R, Reid KF, Latham NK. J Appl Gerontol. 2025 Jun 11:7334648251342833.

DOI: 10.1177/07334648251342833 **PMID:** 40499134

Abstract

Falls are a common public health problem; one-third of individuals 65-years or older fall annually. A digitally delivered home exercise program could be an effective way to deliver fall prevention interventions to at-risk older adults. The aim of this study was to explore the experiences and perceptions of at-risk older adults enrolled in a 12-week digitally delivered home-based fall prevention exercise program. Semi-structured interviews (*N* = 16) were conducted by a user-experience specialist (75% female, age 77.3 years). Participants reported that the program increased exercise intensity and introduced new exercises, such as balance training. Participants highlighted the exercise physiologist motivational coach as a fundamental element of the program to support motivation and adherence. Recommendations for the exercise program included more variety of exercises, individualization of the exercise program, and live virtual interactions. This qualitative analysis provides insight into the acceptability of a digital fall prevention exercise intervention through participant feedback and perception.

Keywords: exercise; falls; intervention; qualitative methods.

Self-administered dual-task training reduces balance deficits and falls among community-dwelling older adults: a multicentre parallel-group randomised controlled trial with economic evaluation protocol

Khan MJ, Fong KNK, Wong TW, Tsang WW, Chen CH, Chan WC, Winser S. BMJ Open. 2025 Jun 24;15(6):e089915.

DOI: 10.1136/bmjopen-2024-089915 **PMID:** 40555445 **PMCID:** PMC12198793

Abstract

Background: Falls are common causes of disability, reduced disability-adjusted life years and death in older adults. Balance deficits and cognitive impairment are common causes of falls. Dual-task training is a new strategy that can potentially improve balance and cognitive function, leading to decreased falls. The effectiveness and cost-effectiveness of self-administered dual-task (sDT) training to improve balance and prevent falls is not known. We developed sDT training combining physical and cognitive tasks to improve balance and reduce falls. The proposed randomised controlled trial (RCT) with economic evaluation is to test the effectiveness and cost-effectiveness of the sDT compared with self-administered single-task training (sST) in this population.

Methods and analysis: In this RCT, we will recruit 190 community-dwelling older adults with a history of at least one fall over the last 6 months from 11 elderly centres. The older adults will be randomly assigned to the sDT (n=95) and sST groups (n=95). Each group will be offered in six training workshops to teach the participants either sDT or sST depending on the group allocation. Each workshop will last an hour and will be held once every 2 weeks for 3 months. Besides, the participants will be instructed to repeat the exercises at home two times weekly for 3 months. Following the intervention phase, the participants will continue unsupervised home-based exercises for 6 months. Assessments will be performed before, after and 6 months after completing the intervention. A fall calendar and cost diary will be provided to each older adult to record the number of falls and fall-related costs during and after the intervention to assess fall incidence and cost-effectiveness. Effectiveness will be assessed using a negative binomial regression model following the intention-to-treat principle for falls and a linear mixed model for the additional measure and cost-effectiveness using a Markov model.

Ethics and dissemination: This study has ethical approval from the PolyU Institutional Review Board for conducting research on human subjects (Ref: HSEARS20210322005). The results will be disseminated through seminars for individuals and health practitioners, international conferences and published in peer-reviewed journals.

Trial registration number: NCT05533333.

Keywords: Aged; Aging; Clinical Protocols; Clinical Trial; Health economics; Rehabilitation medicine.

The "Method of Physical Action" in Theatre Training Improves Balance and Reduces Fall Risk in Older Adults Living in Subsidized Housing: A Randomized Controlled Trial

Kirklin K, Qu H, Mayor E, Lowman JD, Gao J, Edwards L, Li P, Yuen HK. Innov Aging. 2025 May 6;9(6):igaf046.

DOI: 10.1093/geroni/igaf046 **PMID:** 40600024 **PMCID:** PMC12210949

Abstract

Background and objectives: Residents of subsidized senior housing (SSH) need housing-based interventions to address high rates of physical inactivity and social isolation that can lead to increased risks of physical and mental health impairments. Theatre experience training (TET) programs have been shown to improve cognitive function, emotional well-being, social connection, and health-related quality of life (HR-QoL) in this population. This study evaluated the effect of an innovative TET program involving the method of physical acting on objective measures of physical functioning and emotional stress.

Research design and methods: This single-blind trial randomized SSH residents from 5 SSH communities to a 10-week, twice-weekly TET program or a waitlist control arm, with randomization conducted separately in each SSH. Participants' static balance, functional mobility, lower body strength, HR-QoL, emotional stress as measured by hair cortisol levels, and fall incidents were assessed at baseline, postprogram, and 3-month follow-up.

Results: The study enrolled 81 participants; 53 were randomized to the TET arm and 28 to the waitlist arm. TET arm participants had improved static balance and reduced falls postprogram compared with control arm participants. Some carry-over effect was observed at the 3-month follow-up. No net benefit was observed for functional mobility, lower body strength, HR-QoL, or stress levels at the postprogram or 3-month follow-up assessments.

Discussion and implications: The TET program involving the method of physical acting can improve static balance and reduce fall incidents in SSH residents. Ongoing TET programs in SSH may help residents maintain reductions in fall incidents. Clinical Trial Registration Number: NCT04582370.

Keywords: Arts-based leisure activities; Drama; Low-income senior housing; Physical functioning.

Characteristics of Falls among Community-Dwelling Older Adults: The SCOPE Study

Melzer I, Freiberger E, Britting S, Lattanzio F, Melzer Y, Ben-Romano R, Roller-Wirnsberger R, Wirnsberger G, Mattace-Raso F, Tap L, Gil P, Formiga F, Moreno-González R, Kostka T, Guligowska A, Arnlov J, Carlsson AC, Fabbietti P, Kob R; SCOPE investigators. Gerontology. 2025;71(4):253-272.

DOI: 10.1159/000544962 **PMID:** 40552840 **PMCID:** PMC12037155

Abstract

Introduction: Falls among older adults are frequent and will remain a health concern. We describe fall characteristics among older adults living independently in the community based on location, severity, and sex.

Methods: As part of the SCOPE study, fall occurrence, location, causes, circumstances, and consequences were reported by 1,754 community-dwelling older adults across Europe at baseline (F0), 12-month follow-up (FU12), and 24-month follow-up (FU24). A geriatric assessment that included demographics, clinical and medication assessment, depression, Cumulative Illness Rating Scale, blood and urine examination, hand grip strength, and fear of falling was performed. Falls characteristics were described, and a multivariate logistic regression analysis was performed to examine the probability of being severely injured because of a fall, inside or outdoors.

Results: Data on falls revealed 938 falls at baseline, 773 falls at FU12, and 797 falls at FU24. Approximately 70% of these falls resulted in no injury or untreated injuries, while 8.5% led to bone fractures. Most falls (54.8%) occurred outdoors, primarily during ambulation (64.6%). About 50% of the falls were due to trips, slips, or bumping into objects, while 20.3% were due to balance and gait impairments. Women experienced falls about 30% more frequently than men.

Conclusions: Our findings offer new insights into the patterns of falls by location, sex, and injury type. This may help suggest ways of preventing falls. It is reasonable to recommend that older adults train their balance and specifically balance reactive responses to a situation whenever balance is lost accidently and unexpectedly.

Keywords: Community-dwelling old adults; Fall; Injurious falls.

A Multimodal Fall Prevention Intervention in the Setting of the Emergency Department

Niznik JD, Small C, Kelley CJ, McMullen J, Anton G, Roberts E, Lourduraj S, Casey MF, Busby-Whitehead J, Davenport K. J Am Geriatr Soc. 2025 Jun 27. doi: 10.1111/jgs.19613. Online ahead of print.

DOI: 10.1111/jgs.19613 **PMID:** 40576643

Abstract

Background: The emergency department (ED) is an opportune setting for fall prevention interventions. We implemented and evaluated a multimodal falls prevention intervention addressing medications, mobility, and functional risk factors among older adults presenting to the ED for fall-related injuries.

Methods: We implemented a quality improvement intervention at two hospitals among ED visits for adults aged 65 and older with a chief complaint of fall between May 2023 and June 2024. The intervention included: (1) medication review by a pharmacist; (2) assessment by physical therapy (PT); and (3) assessment by occupational therapy (OT). We conducted a retrospective evaluation of electronic health records and reported the proportion of patients that received screening along with risk factors, recommendations, adherence to recommendations, and return visits at 3 and 6 months. We used logistic regression to examine factors associated with return visits.

Results: We identified 686 older adults who received ≥ 1 screening. Most patients received PT and OT evaluations (94.8% and 93.4%), while fewer (15.2%) received medication reviews. The most common problems identified by PT and OT were fall risk, decreased mobility, and impaired balance. Discharge to a skilled nursing facility was the most common recommendation (55.5% PT, 55.1% OT) followed by home care (33.1% PT, 31.2% OT). High-risk medications most often identified were anticoagulants, antidepressants, and gabapentin. The most common recommendation was to "discuss with a primary care physician." Among those who received ≥ 1 intervention, 8.9% experienced a return visit within 3 months and 12.8% within 6 months. Inpatient admission was associated with increased likelihood of return visits compared to discharge from the ED.

Conclusion: The most prevalent risk factors for falls among older adults presenting to the ED are likely modifiable through PT and OT intervention. Further research is needed to address uptake barriers and longitudinal impact on outcomes.

Keywords: emergency department; falls prevention; occupational therapy; pharmacy; physical therapy.

Proprioceptive Control of Muscle Activation in Aging: Implications for Balance and Fall Risk

Oleksy Ł, Mika A, Sopa M, Stolarczyk A, Adamska O, Zyznawska J, Buryta R, Ciepiela P, Witkowski J, Kielnar R. Biology (Basel). 2025 Jun 16;14(6):703.

DOI: 10.3390/biology14060703 **PMID:** 40563954 **PMCID:** PMC12189530

Abstract

(1) Background: This study aimed to assess whether older adults exhibit greater discrepancies between intended and actual motor unit recruitment, which could affect the quality of muscle activation and potentially increase the risk of falls. (2) Methods: Forty-eight physically active older women were assessed (65 ± 6 years, 164 ± 6 cm, and 76 ± 7 kg). The bioelectrical activity (EMG) of the vastus lateralis oblique (VLO) and vastus medialis oblique (VMO) muscles were assessed during isometric testing with the knee joint bent to 75 degrees. The participants were instructed to press against a stable bar for 5 s at a specific percentage of their perceived force level (at 15%, 30%, and 60% of MVC) when the EMG activity was recorded. Balance was assessed using a stabilometric platform in a standing position. (3) Results: In all three thresholds, the bioelectrical activity of the VLO and VMO muscles significantly deviated from what was expected under the assumption of a nearly linear relationship between muscle force and bioelectrical activity. In each of the three thresholds, it did not exceed 10% MVC and significantly differed only between the 15% and 60% MVC thresholds. No significant differences were found between the dominant and non-dominant sides. A significant relationship was observed between the sway area (Area 95%) and the activity of the non-dominant limb VLO muscle. (4) Conclusions: Our results suggest that older adults experience deficits in muscle activation perception, leading to discrepancies between intended and actual muscle engagement, which may affect functional task performance and potentially increase fall risk.

Keywords: balance; bioelectrical activity (EMG); elderly adults; fall risk; proprioception.

Evaluating the effectiveness of an exercise program based on the Adapted Utilitarian Judo program by analyzing fall competence in older adults

Ortiz-Molina M, Bååthe KS, DelCastillo-Andrés Ó, Del Carmen Campos-Mesa M. BMC Geriatr. 2025 May 31;25(1):395.

DOI: 10.1186/s12877-025-06058-6 **PMID:** 40450210 **PMCID:** PMC12125915

Abstract

Population aging increases the risk of falls, particularly among postmenopausal women, which can negatively impact their quality of life. Research suggests that multifactorial exercise programmes can help reduce this risk. This study evaluates the effectiveness of an exercise program based on Adapted Utilitarian Judo (JUA) in enhancing older adults' ability to safely manage falls; in this study called "fall competence". Fall competence can be defined as having the knowledge how to fall safely, as well as possessing the motor skills and confidence (self-efficacy) to execute it effectively. A quasi-experimental design was used, 22 participants, all female, in the Experimental Group (EG = mean age 75.77 ± 7.12 years) and 23 participants in the Control Group (CG = mean age of 75.96 ± 5.09 years). Self-efficacy and competence in backward (BF) and lateral falls (LF) were assessed pre- and post-intervention using the Strömqvist Bååthe Test. Sessions progressed from basic postures to falls from greater heights, all conducted under the guidance of a specialised instructor. Significant improvements in fall competence were observed in the experimental group (EG) after the 12-session intervention. Notable changes were found in backward falls ($\chi^2(1) = 24.9$, $p = 0.001$, $V = 0.71$) and lateral falls ($\chi^2(1) = 28.6$, $p = 0.001$, $V = 0.80$), with a large effect size, indicating a significant impact of the intervention on improving fall competence. In conclusion, this research brings to the scientific literature further evidence that judo-inspired exercise programs such as the JUA programme can be an effective tool to improve the quality of life of the older adult by contributing to improving their competences that allow them to remain independent in society.

Keywords: Adapted Utilitarian Judo; Falling techniques; Falls; Functional training; Injury prevention; Self-efficacy; Well-being.

Multicomponent Exercise and Functional Fitness: Strategies for Fall Prevention in Aging Women

Schneider A, Leite LB, Teixeira J, Forte P, Barbosa TM, Monteiro AM. Sports (Basel). 2025 May 24;13(6):159.

DOI: 10.3390/sports13060159 **PMID:** 40559671 **PMCID:** PMC12196961

Abstract

Aging is associated with physiological changes that increase the risk of falls, impacting functional independence and quality of life. Multicomponent exercise training has emerged as an effective strategy for mitigating these risks by enhancing strength, balance, flexibility, and aerobic capacity. This study aimed to evaluate the effects of a 30-week multicomponent training program on functional fitness and fall prevention in older women. A parallel, single-blind randomized controlled trial was conducted with 40 participants (aged ≥ 65 years), divided into an exercise group and a control group. The intervention combined strength, balance, coordination, and aerobic training, following international exercise guidelines for older adults. Functional fitness was assessed using validated tests, including the Timed Up and Go (TUG) test, lower limb strength, flexibility, and aerobic endurance measures. Results demonstrated significant improvements in the intervention group, particularly in TUG performance ($p < 0.001$), lower limb strength ($p < 0.001$), and flexibility ($p < 0.05$), indicating enhanced mobility and reduced fall risk. These findings reinforce the importance of structured, multicomponent training programs for aging populations, particularly women, who experience greater musculoskeletal decline due to menopause-related hormonal changes. Future research should explore long-term retention of benefits and optimize intervention strategies. This study highlights the critical role of tailored exercise programs in promoting active aging, improving functional capacity, and reducing healthcare burdens associated with fall-related injuries.

Keywords: aging women; fall prevention; functional fitness; multicomponent exercise; strength and balance training.

Challenges and opportunities for falls prevention: an online survey across European healthcare professionals

Seppala LJ, Frith J, Skelton DA, Becker C, Blain H, Kenny RA, Linn AJ, Ryg J, Arnadottir SA, Bahat G, Bonnici M, Mora MÁC, Dionyssiotis Y, Frankenthal D, Hartikainen S, Helbostad JL, Herrero AC, İlhan B, Jonsdottir AB, Markovski M, Roller-Wirnsberger R, Ruggiero C, Saltvedt I, Skalska A, Smedberg D, Soulis G, Szczerbińska K, Topinkova E, Veninšek G, Vlaeyen E, Ylli A, van der Velde N; European Geriatric Medicine Society Special Interest Group on Falls and Fractures. Eur Geriatr Med. 2025 Jun 17.

DOI: 10.1007/s41999-025-01237-5 **PMID:** 40528097

Abstract

Purpose: To explore the challenges and opportunities for the implementation of falls preventive services across Europe.

Methods: An online cross-sectional survey among healthcare professionals was initiated by the European Geriatric Medicine Society (EuGMS) Special Interest Group on Falls and Fractures containing a Likert scale and multiple-choice questions on education and knowledge, current practices, barriers, and facilitators for falls prevention. Survey participation for healthcare professionals was encouraged by the EuGMS through an email invitation, website banner, and social media. National representatives from 24 countries further promoted it via societies, local networks, and hospital channels.

Results: A total of 1669 multidisciplinary healthcare professionals participated from 34 European countries (median 47 years; 75% female; 40.6% physicians (73.3% geriatricians/trainees), 36% physiotherapists, 23.4% other healthcare professionals). Only 26.9% believed their undergraduate education adequately prepared them for clinical practice in this area. A total of 75.8% of respondents reported opportunistically screening older adults for fall risk often or always during consultations. Gait and balance assessment was considered the most important and was the most frequently performed component of the multifactorial fall risk assessment. The top-five barriers were staffing issues, lack of time, older adults' non-adherence to recommended strategies, workload related to falls prevention, and prioritizing other tasks. The top-five facilitators were more time, easy-to-use guidelines, sufficient resources, increased education and training on falls prevention, and increased collaboration. We observed regional and country-level variation in these top barriers and facilitators.

Conclusion: This survey highlights the need for improved undergraduate education in falls prevention across Europe. It is essential to educate and engage governmental bodies and insurers to secure their support and prioritization of falls prevention initiatives. Furthermore, enhancing education, addressing older adults' nonadherence, interdisciplinary collaboration and providing easy-to-use guidelines seem crucial for effective implementation. The falls prevention strategy should be tailored to the local context.

Keywords: Falls prevention; Geriatric medicine; Implementation; Injury; Survey.

Beam walking increases gait velocity and reduces falls risk in older adults

Sidaway B. Exp Gerontol. 2025 Jun 18:208:112814.

DOI: 10.1016/j.exger.2025.112814 **PMID:** 40541694

Abstract

Introduction: A third of community-dwelling older adults will fall at least once per year, often during walking. In such individuals, the greatest postural instability during walking occurs in the mediolateral direction and thus lateral instability is a significant risk factor for falls. The current study uses one-month of beam walking to challenge the dynamic mediolateral stability of older adults in an attempt to improve balance and reduce falls risk.

Material and methods: 25 community dwelling older adults over 70 years of age (Mean = 83.5 yrs.) completed a fear of falling questionnaire, the Activities-specific Balance Confidence (ABC) scale, the Dynamic Gait Index (DGI), and normal and fast walking trials. Participants then walked along a series of wooden beams of decreasing widths. Following pretest measurements participants practiced walking on the beams twice a week for 4 weeks. Assessments were conducted at the end of practice (posttest) and one week later (retention test).

Results: At the pretest 83 % of the participants reported they were somewhat afraid of falling while at the retention test 37 % were somewhat afraid of falling. ABC scores improved from the pretest (M = 61 %) to the retention test (M = 90 %). The DGI also improved significantly as a result of the beam-walking. Gait analysis revealed that stride length and gait velocity increased significantly following training while stride length and stride width variability decreased.

Conclusion: Beam training appears to be a simple intervention that can improve dynamic mediolateral stability consequently reducing the falls risk of older adults.

Keywords: Falls risk; Gait; Mediolateral stability; Older adults.

Older persons' experiences with wearable sensor-based fall risk screening in free-living conditions - a qualitative study

Törnblom M, Rönkkö K, Ådahl K, Karlsson S, Olsson Möller U, Nivestam A. BMC Geriatr. 2025 Jun 21;25(1):426.

DOI: 10.1186/s12877-025-06100-7 **PMID:** 40544281 **PMCID:** PMC12181887

Abstract

Background: Falls are common among older persons and can have a major impact on their lives. Wearable sensors used in free-living conditions (moving naturally in one's daily living environment) can be used to predict falls and fall risks. To understand if using the wearable sensors is an acceptable way for older persons to be screened for fall risks, it is important to have knowledge of older persons' experiences using wearable sensor-based technologies for fall risk assessment in free-living conditions Therefore, this study aimed to describe older persons' experiences of using such technology.

Methods: A qualitative study using individual interviews was conducted with 21 community-dwelling older persons (aged 77-81) in Sweden between April and September 2024. The older persons wore a thigh-mounted wearable sensor for one week to screen for fall risks in free-living conditions. Interviews were conducted 9-89 days (median 15 days) after sensor use and were analysed using conventional qualitative content analysis.

Results: Older persons' experiences with wearable sensor-based fall risk screening were described using the overarching theme 'Being an older person in a fall screening process' containing five categories: 'Seeing a need for a fall risk sensor but imagining it as an unattainable ideal', 'Utilising a wearable sensor can be uncomplicated and fun', 'Having worries and experiencing problems', 'Thinking about what the wearable sensor has registered about me', and 'Reflecting on how I can benefit from the screening'.

Conclusions: The older persons had various experiences with the wearable sensor-based screening for fall risks in free-living conditions. The wearable sensor was easy to use, although problems could occur while wearing it, such as losing the sensor or developing skin problems. The older persons wanted to benefit from the screening and improve their health based on the results. Further research could focus on the accuracy of fall predictors used in free-living conditions for assessing fall risks in older persons, since the wearable sensor was perceived as acceptable to use.

Keywords: Aged; Balance; Community-dwelling; Fall risk assessment; Falls; Interviews; Person-centredness; Physical activity; Preventive home visits; Sensor; Technology.

Effective Therapeutic Strategies to Prevent Frailty and Falls in Community-Dwelling Older Adults

Tsvetkov D, Meyer-Tönnies MJ, Tzvetkov MV, Weitschies W, Engeli S, Lebedeva A, Hannemann A, Jordan MC, Garscha U, Valentini L, Antonenko D, Kennes LN, Gollasch M. Aging Dis. 2025 Jun 17.

DOI: 10.14336/AD.2025.0445 **PMID:** 40540724

Abstract

Frailty and the consequent risk of falls represent significant challenges for community-dwelling older adults, often leading to severe injuries, functional decline, and loss of independence. Falls typically result from multiple interacting risk factors, many of which are modifiable through targeted interventions. This mini-review focuses on evidence from randomized controlled trials evaluating effective therapeutic strategies to prevent frailty and falls. Comprehensive assessment and management of modifiable risk factors have been shown to significantly reduce fall incidence. Key interventions include community-based and home-based exercise programs emphasizing balance and strength training. Additionally, the treatment of osteoporosis is crucial to reducing the risk of fall-related fractures. Other modifiable risk factors, such as orthostatic hypotension, polypharmacy, environmental hazards, osteoporosis, malnutrition, and cognitive impairment, require targeted assessment and intervention. Despite these advances, further research is needed to optimize multifactorial interventions and tailor strategies to individual risk profiles. Innovative research directions now span from micro to macro levels, incorporating insights from animal models to human studies, aiming to unravel underlying mechanisms and develop personalized therapeutic strategies. This review discusses emerging evidence and new interdisciplinary research avenues that offer hope for mitigating frailty and preventing falls in community-dwelling older adults.

Editorial: Gender differences in falls and mobility patterns of older adults

van Schooten KS, Yang Y. Front Public Health. 2025 Jun 9:13:1631587.

DOI: 10.3389/fpubh.2025.1631587 **PMID:** 40552230 **PMCID:** PMC12183060

Abstract

No abstract available

Keywords: accidental falls; equity; fall prevention; fall risk; gender; mobility; older people; sex

The development of BE-EMPOWERed: Belgian program Enhancing the uptake and Effectiveness of a Multifactorial falls Prevention intervention in Older community-dWElling peRsons

Vandervelde S, Vlaeyen E, Dierckx de Casterlé B, Flamaing J, Belaen G, Delbaere K, Clemson L, Swann M, Milisen K. BMC Geriatr. 2025 Jun 5;25(1):412.

DOI: 10.1186/s12877-025-05879-9 **PMID:** 40474058 **PMCID:** PMC12142946

Abstract

Background: Falls among people aged 65 years and older represent a global health challenge, with substantial morbidity, mortality and economic costs. Despite strong evidence supporting the efficacy of multifactorial falls prevention interventions, their implementation in community settings remains inconsistent. There is a need to systematically develop and proactively tailor multifactorial falls prevention interventions and implementation strategies to the context. This study aims to describe the systematic development of the BE-EMPOWERed program, a comprehensive falls prevention initiative, and its corresponding implementation strategies to enhance the uptake and effectiveness of a multifactorial falls prevention interventions in community-dwelling older people.

Methods: The BE-EMPOWERed program was developed using Intervention Mapping (IM) and Implementation Mapping guided by the Medical Research Council (MRC) framework. The development process involved co-production with key stakeholders, including older people, healthcare professionals, and local policymakers, ensuring the program's relevance and feasibility in real-world settings. The program components were pretested, refined, and evaluated through iterative cycles within primary care areas, incorporating continuous feedback from participants and implementation facilitators to address the complexities of the context and real-world implementation.

Results: The BE-EMPOWERed program includes a group-based intervention for older people and workshops for healthcare professionals. A detailed implementation plan was created and implementation facilitators were trained to support the adoption of multifactorial falls prevention interventions across primary care areas in Flanders. Key implementation strategies for older people included tailored interventions, personal risk assessments, active learning, participation and opportunities for social comparison. For healthcare professionals, the strategies focused on raising awareness, guided practice and coalition-building. Additionally, active learning, guided practice, stakeholder engagement, community development and agenda setting were pivotal in training implementation facilitators and executing the implementation plan.

Conclusions: The successful implementation of multifactorial falls prevention interventions in community settings requires addressing multiple contextual levels, from individual to organizational and policy-related factors. This study provides a comprehensive guide for the systematic development and implementation of complex interventions, offering practical insights for future initiatives aimed at improving community-based health outcomes, enhancing program sustainability, and facilitating the broader application of falls prevention interventions.

Keywords: Aged; Community setting; Falls prevention; Implementation.

The Otago Exercise Program's effect on fall prevention: a systematic review and meta-analysis

Wang C, Kim SM. Front Public Health. 2025 Jun 3:13:1522952.

DOI: 10.3389/fpubh.2025.1522952 **PMID:** 40529705 **PMCID:** PMC12172654

Abstract

Objectives: This study aims to compare the effectiveness of the Otago Exercise Program (OEP) in fall prevention between generally healthy older adults and those with compromised health conditions, assessing which group benefits more from the intervention.

Design: This meta-analysis evaluated the effectiveness of the OEP in fall prevention among general older adults and older adults with compromised health, including individuals at high risk of falls, cognitive impairment, musculoskeletal disorders, or frailty syndrome.

Methods: A comprehensive search was conducted in Web of Science, PubMed, Scopus, Cochrane Library, and Embase, following strict eligibility criteria. Data extraction, risk of bias assessment, and meta-analysis were conducted to evaluate the effectiveness of the intervention.

Results: Fifteen studies with 1,278 participants were included. The OEP significantly improved balance (WMD = 0.15, 95% CI [-0.05, 0.35]), gait (WMD = 0.49, 95% CI [0.18, 0.80]), and lower limb strength (WMD = 0.84, 95% CI [0.61, 1.07]) in general older adults. The effects were more pronounced in older adults with compromised health, particularly in gait, particularly in gait (WMD = 0.92, 95% CI [0.13, 1.72]) and lower limb strength (WMD = 2.24, 95% CI [1.04, 3.45]). However, the OEP did not significantly improve physical function or upper limb strength in either group.

Conclusion: The OEP effectively improves balance, gait, and lower limb strength, especially in older adults with compromised health. However, it does not significantly impact physical function or upper limb strength. This study has limitations, including potential bias, study heterogeneity, and variations in interventions, which may affect result reliability. A cautious interpretation is needed, and future research should focus on analyzing diverse populations and ensuring adequately sized samples to enhance the reliability of the findings.

Systematic review registration: PROSPERO (CRD42024549302), https://www.crd.york.ac.uk/PROSPERO/view/CRD42024549302.

Keywords: Otago exercise; fall; meta-analysis; older adult; prevention.

The effects of Baduanjin intervention on balance, lower limb strength, gait biomechanics and risks of fall among elderly

Xie S, Meng C, Sakipova Z, Shaharudin S. Prev Med Rep. 2025 Jun 3:55:103129.

DOI: 10.1016/j.pmedr.2025.103129 **PMID:** 40529597 **PMCID:** PMC12171621

Abstract

Objective: Falls have been significantly associated with accidental deaths among individuals over 60 years. Therefore, improving balance function is critical in geriatric rehabilitation. This study explored the impacts of Baduanjin on the risk of falls in terms of balance, isometric knee joint strength, and gait parameters.

Methods: Forty-two Chinese individuals were randomly divided into the Baduanjin group or walking group. Their gait, balance, lower limb strength, and fall risks were assessed at pre-, mid- and post-intervention. Any falls they experienced for the next six months were recorded. The data of this study were collected at Shanxi Normal University from September 2023 to January 2024.

Results: The Baduanjin group demonstrated improved performance in the sway path balance test compared to the control group, particularly in the coronal plane ($p < 0.05$). In addition, the Baduanjin intervention enhanced the participants' gait symmetry during early and mid-stance gait phases and their maximum isometric strength of the knee extensor ($p < 0.05$).

Conclusion: Baduanjin intervention is more effective in improving balance and preventing falls among the elderly than walking at the same intensity.

Keywords: Biomechanics; Exercise intervention; Gait; Human health; Older adults.

Metabolomic Profiling Identifies Early Biomarkers of Frailty, Balance Impairment, and Fall Risks in Older Adults

Zhawatibai A, Liu H, Xie A, Zhou H, Jiang J, Yuan N, Wang J, Dan C, Li S, Wang S. Gerontology. 2025 Jun 30:1-25.

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Abstract

Introduction: The global aging population poses significant challenges to healthcare, with frailty, balance impairment, and fall risks being prominent issues. However, the conventional clinical assessments often fail to detect early signs of these conditions. This study aimed to explore the potential of Metabolomics in early identification of biomarkers related to frailty, poor balance, and fall risks in older adults.

Methods: We analyzed plasma samples from 110 participants aged 25 to 98 years using untargeted metabolomic analysis. Clinical assessments, including Instrumental Activities of Daily Living (IADL), Morse Fall Risk Scale, Timed Up and Go (TUG), Fried Frailty Criteria, etc., were performed. We examined the correlation between metabolomic results, aging-related blood tests, and clinical assessments. Statistical analysis and pathway analysis were used to identify key metabolic alterations.

Results: The metabolomics analysis identified 914 metabolites matching in the human metabolome database, with 293 metabolites significantly correlated with age. Metabolomic profiles showed distinct alterations in older adults, with significant metabolic changes observed in the Old-Old group, particularly in pathways related to Lipid Metabolism, Sphingolipid Signaling, and Fatty Acid Metabolism. A new age classification based on metabolic profiles revealed significant differences in frailty risks across groups, with metabolic signatures linked to poor balance and fall risks.

Conclusion: Metabolomics offers a promising approach to identify early biomarkers of frailty, balance impairment, and fall risks in older adults. The integration of metabolic profiles with clinical assessments could lead to more precise and personalized healthcare interventions, improving fall prevention strategies and frailty management. Future studies with larger cohorts are needed to validate these findings and explore the clinical utility of Metabolomics in aging-related healthcare.