Featured Falls Research – September

Maintaining independence at home after a fall: a process evaluation of the MAINTAIN multicomponent intervention for people living with dementia

Greene L, Allan LM, Bingham A, Sharma A, Whale B, Barber R, Fox C, Goodwin VA, Gordon AL, Hall AJ, Harwood RH, Hulme C, Jackson TA, Litherland R, Parry SW, Ukoumunne O, Morgan-Trimmer S. Age Ageing. 2025 Aug 29;54(9):afaf245.

DOI: 10.1093/ageing/afaf245 **PMID:** 40928757 **PMCID:** PMC12421879

Abstract

Background: People with dementia who have a fall can experience both physical and psychological effects, often leading to diminished independence. Falls impose economic costs on the healthcare system. Despite elevated fall risks in dementia populations, evidence supporting effective home-based interventions remains limited.

Methods: Multiple-methods process evaluation within a pilot cluster randomised controlled trial informed by a realist approach. Settings included six UK sites/clusters (three intervention, three control). Fidelity checks on routine data collection and fidelity observations of intervention sessions, multidisciplinary team meetings and supervision sessions were undertaken. Semi-structured interviews were conducted with people with dementia, caregivers and intervention therapists.

Results: The MAINTAIN intervention demonstrated high fidelity in home assessments and intervention delivery, with participants receiving a mean of 15 of the 22 available sessions with a range of 5-25 sessions. Qualitative findings revealed that regular home visits increased engagement and motivation. Multidisciplinary team support enhanced therapists' confidence, particularly with complex cases. While most participants achieved their functional goals and reported improved confidence, challenges included geographical disparities in service delivery, carer burden and varying effectiveness of referral pathways. Therapists' attitudes towards advanced dementia influenced intervention delivery. The paired approach, involving both the person living with dementia and their carer, supported activity engagement but occasionally added extra responsibilities for caregivers.

Conclusions: MAINTAIN was both feasible and acceptable. Future studies should consider standardising multidisciplinary support, incorporating targeted falls-related anxiety support and establishing sustainable post-intervention maintenance strategies. Protocol adaptations, such as video consultations, showed promise in addressing workforce constraints.

Keywords: activities of daily living; dementia; falls prevention; older people; process evaluation.

Benefits of Exergaming Regarding to Conventional Physical Therapies on Balance and Fall Risk in Prefrail and Frail Older People: A Meta-Analysis of Randomized Controlled Trials

Hernandez-Martinez J, Cid-Calfucura I, Vásquez-Carrasco E, Branco BHM, Herrera-Valenzuela T, Valdés-Badilla P. Inquiry. 2025 Jan-Dec;62:469580251372362.

DOI: 10.1177/00469580251372362 **PMID:** 40956936 **PMCID:** PMC12441291

Abstract

This systematic review and meta-analysis evaluated how exergaming (EXG) compares with various conventional physical therapies in improving balance and reducing fall risk among prefrail and frail older people. We searched 6 databases PubMed, Medline, CINAHL Complete, Scopus, the Cochrane Library, and Web of Science up to April 2025. Study quality and evidence certainty were appraised using PRISMA, TESTEX, Rob 2, and GRADE. For meta-analysis, Hedge's g effect sizes were computed for balance and fall risk outcomes. We chose fixed- or random-effects models and conducted subgroup analyses based on therapy dosage (sessions per week and minutes per session). The protocol is registered in PROSPERO (CRD420251009891). From 2434 records, 10 RCTs (n = 400; mean and standard deviation age 75.7 ± 5.9 years) met inclusion criteria. Overall and subgroup meta-analyses (4 each) showed significant EXG benefits for the Mini-BESTest ($P < .01$), Timed Up-and-Go (TUG; $P < .05$) and Fall Efficacy Scale-International (FES-I; $P < .05$). No statistically significant change was found for the Berg Balance Scale (BBS; $P = .05$). When stratifying by dosage, EXG outperformed controls in TUG specifically for protocols with fewer than 3 sessions/week and under 50 min/session ($P < .01$). Dosage did not significantly influence FES-I outcomes. EXG is an alternative therapy that improves balance by reducing the fall risk, as measured by the Mini-BESTest, TUG, and FES-I, compared with conventional physical therapies (ie, physiotherapy, balance training, strength training, aerobic training, multicomponent training). Notably, protocols with <3 weekly sessions of <50 min each yielded the most pronounced TUG improvements.

Keywords: aging; exergaming; frail elderly; postural balance; video games.

Synergistic effects of exercise, cognitive training and vitamin D on gait performance and falls in mild cognitive impairment-secondary outcomes from the SYNERGIC trial

Pieruccini-Faria F, Son S, Zou G, Almeida QJ, Middleton LE, Bray NW, Lussier M, Shoemaker JK, Speechley M, Liu-Ambrose T, Burhan AM, Camicioli R, Li KZH, Fraser S, Berryman N, Bherer L, Montero-Odasso M. Age Ageing. 2025 Aug 29;54(9):afaf242.

DOI: 10.1093/ageing/afaf242 **PMID:** 40966614 **PMCID:** PMC12445844

Abstract

Background: Older adults with mild cognitive impairment (MCI) have a higher risk of gait impairments and falls; yet, the effects of multimodal interventions, including combinations of exercises with cognitive training, on improving their mobility remain unclear.

Objectives: To investigate the synergistic effects of aerobic-resistance exercise combined with cognitive training, with or without vitamin D supplementation, on gait performance and falls risk in older adults with MCI.

Methods: The effect of 20 weeks of aerobic-resistance exercise, cognitive training, and Vitamin D supplementation (10 000 IU 3×/week) on gait and falls in older adults with MCI was evaluated in the SYNERGIC trial, using a fractional factorial design. Assessments were conducted at baseline, 6-month endpoint (after intervention) and 12-month endpoint (follow-up). Eligible participants were between the ages of 65 and 84 years with MCI enrolled from 19 September 2016 to 7 April 2020. Main outcomes of interest for gait performance were gait speed and gait variability changes, whilst for falls were incidental falls and incidental injurious falls.

Results: Amongst 161 participants, the four exercise-based arms improved gait speed (+7.5 cm/s, $P < .001$) and reduced falls (incidence rate ratios (IRR) = 0.65, 95% confidence interval (CI): 0.32-1.42, $P = .25$) and injurious falls (IRR = 0.38, 95% CI: 0.15-1.05, $P = .05$) at 6-month endpoint. Falls reduction reached statistical significance (IRR = 0.28, 95% CI: 0.13-0.64, $P = .002$) at 12-month endpoint. Exercises combined with cognitive training showed the greatest gains in gait speed at 6-month endpoint ($P < .001$) and in reducing falls at 12-month endpoint (IRR = 0.24, 95% CI: 0.05-0.77, $P = .02$) compared to the control. Vitamin D did not enhance outcomes and increased gait variability, a marker of instability.

Conclusion: Aerobic-resistance exercise combined with sequential computerised cognitive training improved gait performance at 6 months and decreased the risk of falls and injuries at 12 months in older adults with MCI. The addition of vitamin D did not produce benefits.

Keywords: Falls; Mild Cognitive Impairment; cognitive; exercises; gait; older people; training; vitamin D.

Falls Research – September

Gaming Against Frailty: Effects of Virtual Reality-Based Training on Postural Control, Mobility, and Fear of Falling Among Frail Older Adults

Alhasan HS, Alshehri MA. J Clin Med. 2025 Aug 6;14(15):5531.

DOI: 10.3390/jcm14155531 **PMID:** 40807152 **PMCID:** PMC12347130

Abstract

Background/Objectives: Frailty is a prevalent geriatric syndrome associated with impaired postural control and elevated fall risk. Although conventional exercise is a core strategy for frailty management, adherence remains limited. Virtual reality (VR)-based interventions have emerged as potentially engaging alternatives, but their effects on objective postural control and task-specific confidence in frail populations remain understudied. This study aimed to evaluate the effectiveness of a supervised VR training program using the Nintendo Ring Fit Plus™ on postural control, functional mobility, and balance confidence among frail community-dwelling older adults.

Methods: Fifty-one adults aged ≥65 years classified as frail or prefrail were enrolled in a four-week trial. Participants were assigned to either a VR intervention group (*n* = 28) or control group (*n* = 23). Participants were non-randomly assigned based on availability and preference. Outcome measures were collected at baseline and post-intervention. Primary outcomes included center of pressure (CoP) metrics-sway area, mean velocity, and sway path. Secondary outcomes were the Timed Up and Go (TUG), Berg Balance Scale (BBS), Activities-specific Balance Confidence (ABC), and Falls Efficacy Scale-International (FES-I).

Results: After adjusting for baseline values, age, and BMI, the intervention group showed significantly greater improvements than the control group across all postural control outcomes. Notably, reductions in sway area, mean velocity, and sway path were observed under both eyes-open and eyes-closed conditions, with effect sizes ranging from moderate to very large (Cohen's d = 0.57 to 1.61). For secondary outcomes, significant between-group differences were found in functional mobility (TUG), balance performance (BBS), and balance confidence (ABC), with moderate-to-large effect sizes (Cohen's d = 0.53 to 0.73). However, no significant improvement was observed in fear of falling (FES-I), despite a small-to-moderate effect size.

Conclusions: A supervised VR program significantly enhanced postural control, mobility, and task-specific balance confidence in frail older adults. These findings support the feasibility and efficacy of VR-based training as a scalable strategy for mitigating frailty-related mobility impairments.

Keywords: Nintendo Ring Fit Plus™; balance confidence; exergaming; falls; frailty; functional mobility; older adults; physiotherapy; postural control; virtual reality.

Reducing Fall Risk in Older Adults with COPD: Pilot Study to Test the Efficacy of a Home-Based Exercise Program with Virtual Care Support

Bates A, Furber S, Gilchrist H, Sherrington C, Jones NR, Kershaw M, Franco L, Muir KL, Tiedemann A. Int J Chron Obstruct Pulmon Dis. 2025 Sep 11;20:3175-3186.

DOI: 10.2147/COPD.S502082 **PMID:** 40958981 **PMCID:** PMC12435358

Abstract

Purpose: Older adults with chronic obstructive pulmonary disease (COPD) have a higher risk of falls than their peers without COPD. Home-based exercise programs can improve balance and strength and reduce falls in older adults and could be an option for older adults with COPD who access virtual care. We pilot tested a 6-month home-based balance and strength exercise program with virtual care support aimed at improving strength and balance in people with COPD aged 50 years and over.

Patients and methods: Adults aged 50 years and over with COPD who access a virtual care service were invited to participate in an exercise program designed to improve balance and strength and reduce fall risk.

Results: Thirteen people enrolled in the pilot program (mean age 72 ± SD 7 years, 9 females). Six participants (46%) reported having one or more falls in the 12-months prior to the study. A mixed model for repeated measures and Bonferroni correction for post hoc pairwise comparisons showed significant improvement in the Short Physical Performance Battery (SPPB) score between baseline and 6-months, effect size of 2.01; 95% CI [0.45-3.58], and between 3-months and 6-months, effect size of 1.65; 95% CI [0.48 to 2.81]. The alternate step test improved by more than 3 seconds between baseline and 3-months, effect size of -3.30; 95% CI [-5.94 to -0.66] and improved by 4 seconds between baseline and 6-months, effect size of -4.01; 95% CI [-7.42 to -0.61]. There was no significant difference in fear of falling between baseline, 3 months or 6 months. The program had a high level of acceptability, with all participants intending to continue to do the exercises and 10/12 (83%) participants stating that they would recommend the program to other people with COPD. The program was feasible to implement, with 12/13 participants remaining in the program and attending exercise sessions.

Conclusion: On average, participants completed the exercises twice per week rather than the recommended 3 times per week. Despite this, the home-based exercise program improved strength and balance, as measured by the SPPB. The program was acceptable to participants and feasible to implement and has the potential to reduce the risk of falls in older people with COPD.

Keywords: accidental falls; balance training; chronic obstructive pulmonary disease; exercise; resistance training.

PReventing Injury in Skilled nursing facilities through optimizing Medications (PRISM), a protocol for a cluster randomized trial to reduce injurious falls in post-acute care

Berry SD, Toles M, Travison TG, McConnell ES, Zullo AR, Little MO, Gwyther L, McDermott C, Lee R, Cary M, Syme M, Kissam S, Hecker E, MacLean KG, Colón-Emeric C. Trials. 2025 Sep 26;26(1):367.

DOI: 10.1186/s13063-025-09122-z **PMID:** 41013714 **PMCID:** PMC12465586

Abstract

Background: Patients who receive post-acute care in a skilled nursing facility (SNF) following a fracture are at high risk for subsequent fall-related injuries. Optimizing medication management may mitigate this risk. This manuscript describes the protocol for a cluster crossover randomized controlled trial titled, PReventing Injury in Skilled Nursing Facilities through optimizing Medications (PRISM), designed to compare the effectiveness of three care models on the rates of injurious falls and other patient-centered outcomes.

Methods: We will enroll 42 SNFs that are sharing electronic health record data with the Long-Term Care Data Cooperative (LTCDC). Matched control facilities will be identified at a ratio of 3:1 based on rural/urban location, profit status, and annual number of post-acute care admissions. Over 6-month periods, in random order, the participating SNFs will sequentially implement three evidence-based care models in a random order: a Deprescribing model, a Bone Health model, and a combined model (referred to as an Injury Prevention model). Patients with recent fractures admitted to participating SNFs for post-acute care during the intervention period will be eligible (target n = 3780). A remote nurse fracture consultant will review medical records, engage in shared decision-making, develop and coordinate a medication optimization plan with SNF and primary care providers, and follow up with the patient and primary care provider upon discharge. The primary outcome is incident injurious falls, measured using Medicare claims data (mean 2-year follow-up). Secondary outcomes include process measures (e.g., adherence with recommendations) and patient-reported outcomes ascertained by telephone survey at 90 days (e.g., medication burden, anxiety, depression, pain, sleep). Safety outcomes will be compared between the three models using Medicare claims data to identify events.

Discussion: This cluster crossover trial aims to compare patient outcomes between each of the three care models and against matched control facilities. Results will inform patients, payors, health systems, and SNF chains of the most effective model to improve outcomes for older adults receiving post-acute care following a fracture.

Trial registration: NCT06304428. Registered on February 25, 2025.

Keywords: Deprescribing; Fracture; Osteoporosis; Post-acute care.

Effectiveness of Safe and Well Visits in reducing falls and improving quality of life among older people: The FIREFLI RCT

Cockayne S, Fairhurst C, Cunningham-Burley R, Mann J, Stanford-Beale R, Hampton S, Wilkinson S, Adamson J, Crossland S, Drummond A, Hewitt CE, Pighills A, Roberts G, Ronaldson S, Scantlebury A, Torgerson DJ; FIREFLI team. Public Health Res. 2025 Sep;13(7):1-62.

DOI: 10.3310/DJHF6633 **PMID:** 41013989

Abstract

Background: Fire and rescue services in England routinely carry out Home Fire Safety Visits which aim to reduce risk of fire, support independent living and improve quality of life. The visits include a person-centred assessment and providing general advice on health-related topics such as preventing falls.

Planned objective: To assess the effectiveness and cost-effectiveness of Home Fire Safety Visits (also known as Safe and Well Visits) to reduce falls and improve quality of life in older adults living in the community.

Design, setting and participants: We designed a multicentre, randomised controlled trial with economic and qualitative evaluations, involving two fire and rescue services in England, to recruit 1156 community-dwelling adults aged 65 years and over.

Interventions: All participants could continue to access routine care from healthcare professionals and were provided with a falls prevention leaflet as part of the trial. The intervention group were additionally offered a Home Fire Safety Visit. The usual care group were offered a visit after they had completed the trial. Blinding was not possible. Participants were randomised 1 : 1 using a secure web-based system.

Main outcomes measures: The primary outcomes were (1) the number of falls per participant and (2) health-related quality of life (EuroQol-5 Dimensions, five-level version) over 12 months from randomisation. Secondary outcomes included fire risk-taking behaviours, loneliness, fear of falling and time to first fall. The planned economic evaluation comprised cost-utility and cost-effectiveness analyses. The qualitative study was designed to examine intervention fidelity and acceptability.

Results: It proved impossible to conduct the trial as planned in the current research landscape. We faced significant delays in setting up and starting recruitment, in large part due to this coinciding with the start of the COVID-19 pandemic. Obtaining regulatory approval took longer than anticipated. Additionally, we were unable to access general practitioner registration data to identify participants as planned and so we had to use Consumer Classification Platform data to identify potential households to send study invitations to. This resulted in a less targeted and non-personalised mail-out as this is not patient-level data so the householder names were unavailable. Ultimately, recruitment was much lower than expected. In total, 237 participants were assessed for eligibility and 63 randomised (intervention, *n* = 32; usual care, *n* = 31). The Home Fire Safety Visits were delivered as planned to both groups; however, the planned statistical and health economic analyses could not be conducted due to the limited data. Data from the qualitative evaluation indicated the intervention was largely acceptable to staff and service users.

Conclusions: Conducting trials in this setting is currently extremely challenging. To facilitate future research, we recommend an urgent review of research governance issues related to the types of personal data that can be accessed and used for research. This review should aim to provide support and avoid creating additional obstacles to research in this area.

Future work: The evidence for the effectiveness and cost-effectiveness of Home Fire Safety Visits remains inconclusive. Research governance in local authorities needs urgent review.

Trial registration: This trial is registered as Current Controlled Trials NCT04717258.

Funding: This award was funded by the National Institute for Health and Care Research (NIHR) Public Health Research programme (NIHR award ref: NIHR128341) and is published in full in Public Health Research; Vol. 13, No. 7. See the NIHR Funding and Awards website for further award information.

Keywords: ACCIDENTAL FALLS; FALLS PREVENTION; FIRE AND RESCUE SERVICE; FIRE SAFETY; FIREFIGHTERS; HEALTH-RELATED QUALITY OF LIFE; HOME FIRE SAFETY VISIT; HOUSE CALLS; RANDOMISED CONTROLLED TRIAL; SAFE AND WELL VISIT.

Exploring the role of intrinsic and extrinsic factors on the associations between sarcopenia and falls in older adults

Coelho-Júnior HJ, Calvani R, Picca A, Russo A, Landi F, Marzetti E. Sci Rep. 2025 Aug 14;15(1):29828.

DOI: 10.1038/s41598-025-15259-3 **PMID:** 40813604 **PMCID:** PMC12354844

Abstract

The present study investigated the moderating effects of intrinsic and extrinsic factors on the association between sarcopenia and falls in older adults. This prospective cohort study was conducted among octogenarians residing in the mountainous Sirente geographic area of Central Italy. Sarcopenia was defined by the coexistence of low muscle mass and dynapenia. Data on fall history and incident falls were collected over a two-year period. A general linear model was used to assess whether intrinsic factors (i.e., multimorbidity, polypharmacy, cognitive function, vision status, nutritional status) and extrinsic factors (i.e., social functioning, environmental characteristics) moderated the relationship between sarcopenia (independent variable) and falls (dependent variable). Data of 364 individuals were examined. Fifty participants (13.7%) reported at least one fall event in the 90 days prior to data collection, while 36 participants (10%) reported having fallen during the follow-up period. Results revealed that intrinsic factors, but not extrinsic ones, significantly influenced this association. Specifically, multimorbidity and polypharmacy were associated with both fall history and incidence, while cognitive function and nutritional status emerged as significant moderators in the longitudinal analysis. In conclusion, these findings underscore the importance of addressing specific intrinsic health-related factors in order to more effectively mitigate the risk of falls among older adults with sarcopenia.

Keywords: Balance; Cognitive function; Frailty; Multimorbidity; Nutritional status; Polypharmacy.

Simple but complex: aged care healthcare professionals' perspectives on the design of a digital falls dashboard

Dodds L, Meulenbroeks I, Silva SSM, Ludlow K, Mercado C, Seaman K, Wabe N, Baysari M, Westbrook JI, Nguyen AD. BMC Med Inform Decis Mak. 2025 Sep 29;25(1):347.

DOI: 10.1186/s12911-025-03135-z **PMID:** 41024091

Abstract

Background: Digital dashboards are widely employed across healthcare settings to present data, supporting timely risk identification and enhancing clinical decision-making. Incorporating feedback from end-users into dashboard design supports their uptake and utilisation. The current study aimed to: (a) understand how healthcare professionals working in residential aged care gather, interpret, transfer and communicate clinical information especially for falls management; and (b) utilise co-design methods to determine healthcare professionals' preferences for presentation, content and functionality of a digital falls dashboard to support delivery of care in residential aged care.

Methods: Participants were recruited via aged care provider and primary health network contacts. Individual interviews with general practitioners (GPs) (n = 3) explored end-user needs including information needs for falls management, decision-making processes, and dashboard preferences. Dashboard prototypes were developed using the interview findings and published guidelines. Prototypes were then presented for feedback in eight workshops (n = 20 participants; residential aged care staff, GPs, and geriatricians) completed via videoconferencing or in-person to gain feedback. Interview and workshop transcripts were analysed using template analysis.

Results: During interviews, GPs discussed difficulties in accessing aged care resident information, clinical decision-making in residential aged care, and use of decision support. During workshops, healthcare professionals shared feedback on the design, content, and functionality of dashboard prototypes. Healthcare professionals also discussed themes of human-technology interaction. This included mistrust of new digital tools and barriers to their use in residential aged care. The current study found that healthcare professionals want a dashboard that displays relevant resident data, such as medications, includes features for benchmarking, and provides detailed insights to support decision making. They expressed a need for evidence-based decision support but advocated for minimal alerts.

Conclusions: Healthcare professionals were receptive to using a dashboard in residential aged care to minimise resident falls. They shared their design ideas in co-design interviews and workshops for a prospective dashboard. Findings informed the initial development and subsequent revisions of the dashboard to align with end-user preferences.

Keywords: Aged care; Clinical dashboard; Dashboard design; Digital health; Electronic health record; Nursing home; Residential aged care facility.

Proportion of participants meeting falls prevention guidelines in an evidence-based community-based exercise program

Fuentes Diaz MF, Sibley KM, Giberson K, Sénéchal M, Bouchard DR. Aging Clin Exp Res. 2025 Sep 4;37(1):273.

DOI: 10.1007/s40520-025-03172-8 **PMID:** 40906306 **PMCID:** PMC12411566

Abstract

Background: Although exercise is strongly recommended to prevent falls in older adults (exercise that challenges balance, performed three hours per week on an ongoing basis), few community-based programs meet these recommendations.

Aims: Assess the proportion of participants meeting fall prevention exercise recommendations in a community-based program and explore how adherence varies by individual characteristics and participation mode (in-person, tele-exercise, or hybrid).

Methods: A cross-sectional analysis of Zoomers in Balance participants who completed an online questionnaire about their demographic data, mode of participation, and their perceived balance intensity in a 12-week series using the Balance Intensity Scale (1-no effort at all to 5-maximal effort). Weekly attendance was self-reported after each 12-week series, and ongoing participation was assessed using registration data over one year.

Results: The average perceived balance intensity was 3.2 ± 0.7 (range 1-5), the average attendance was 1.3 ± 0.6 h/week (range 0.2-4.2), and participants attended an average of 3.4 ± 0.6 series/year (range 2-4). None of the participants met all three guidelines. The most fulfilled recommendation was ongoing participation (43%), which was greater in the hybrid ($B = 2.68$; $p < 0.001$) and tele-exercise ($B = 1.28$; $p < 0.001$) groups compared with the in-person mode. In addition, the mode of participation was associated with meeting one or more guidelines ($\chi^2 = 23.05$; $p < 0.001$), without any significant difference between modes.

Discussion: Offering hybrid participation options could lead to greater adherence to evidence-based guidelines, thereby reducing the risk of falls.

Conclusion: The proportion of participants meeting fall prevention guidelines in a community-based program is low, with a trend indicating that hybrid options are more effective.

Keywords: Adherence; Community-based; Fall prevention; Guidelines; Tele-exercise.

Falls risk perception among older adults and carers: a cross-sectional study

Hasan M, Walsh B, Oldmeadow C, Coda A. BMC Geriatr. 2025 Sep 29;25(1):750.

DOI: 10.1186/s12877-025-06403-9 **PMID:** 41023642

Abstract

Objectives: The main objective of the study was to explore and compare patient and carer perception of risk of falls using a concept perception of falls risk scale. We also investigated the relationship between poor perception of falls risk and potential determinants of poor perception of falls risk.

Methods: A cross-sectional quantitative study was developed to capture perception of risk of falls. Informed written consents were obtained. Face to face and telephone interviews were conducted with questionnaires to explore perception of patients and carers about falls risk.

Results: Participants underwent a structured interview answering survey questions related to perceptions and experiences of falls. Data was collected for 76 patients and 36 carers. 81% of the analysis population exhibited poor perception of falls risk in our concept perception of falls risk scale; this was evident among 88% of patients compared to 67% of carers. Both age and psychotropic medication were found to be potential determinants of differences in poor perception of falls risk.

Conclusion: Perception of risk of fall is low among older adults and their carers. This study findings suggest participants in various settings and their carers need education about their falls risk to improve their falls risk awareness.

Keywords: Carers; Fall; Older adults; Perception; Risk.

PilOT-Measure: a mobile 3D depth sensing application to support accurate and efficient clinician-led home-based falls risk assessments

Ibrahim Z, Money AG, Atwal A, Spiliotopoulou G. BMC Med Inform Decis Mak. 2025 Sep 24;25(1):332.

DOI: 10.1186/s12911-025-03149-7 **PMID:** 40993706 **PMCID:** PMC12462305

Abstract

Background: An aging global population, coupled with high levels of assistive equipment abandonment, has propelled increases in falls-related injuries at home. Equipment abandonment occurs, in-part, due to inaccurate measurements of the patient's home taken during the falls risk assessment process. There is an urgent need to explore the value of new digital mobile technologies to help clinicians to take more efficient and effective measurements of patient's home, thereby enhancing the efficacy of falls risk assessments and potentially minimising equipment abandonment.

Aim: The aim of this study is to present and evaluate the accuracy and efficiency of PilOT-Measure, a digital mobile 3D depth-sensor-enabled measurement guidance application for use by clinicians carrying out falls risk assessments.

Methods: Twenty-one trainee and registered Occupational Therapists took part in this repeated-measures, mixed methods study to evaluate measurement accuracy, task completion time, and overall system usability and user perceptions of the application.

Results: For measurement accuracy, PilOT-Measure outperformed current state of the art handheld tape measure and paper-based measurement guidance booklet. For accuracy consistency, the handheld tape measure and booklet was more consistently accurate for six out of 11 cases. However, PilOT-Measure tended to facilitate significantly faster task completion times, suggesting potential task efficiency benefits. In terms of usability, participants favoured PilOT-Measure and saw potential to reduce administrative tasks and support joint decision-making. Concerns about marker placement on reflective surfaces and patient privacy were noted.

Conclusions: This study highlights the positive role that mobile depth-sensing technologies can potentially play in improving the efficiency and accuracy of falls risk assessments, hence, reducing levels of equipment abandonment and falls related injuries at home. Future work will focus on improving marker placement, measurement accuracy, and accuracy consistency and explore the potential of using PilOT-Measure as a falls risk patient self-assessment tool.

Keywords: 3D mobile application; 3D visualisation; Augmented reality; Depth sensing; Falls prevention; Falls risk factors; Measurement; Occupational therapy; Technology for health; Virtual reality.

Effectiveness of Virtual Reality-Based Training Versus Conventional Exercise Programs on Fall-Related Functional Outcomes in Older Adults with Various Health Conditions: A Systematic Review

Kasicki K, Klimek Piskorz E, Rydzik Ł, Ambroży T, Ceranowicz P, Belcarz Ciuraj M, Król P, Błach W. J Clin Med. 2025 Aug 6;14(15):5550.

DOI: 10.3390/jcm14155550 **PMID:** 40807171 **PMCID:** PMC12347705

Abstract

Background/Objectives: The aim of this systematic review was to compare the effectiveness of virtual reality (VR)-based training with conventional exercise programs in improving functional outcomes related to fall risk among older adults with various health conditions.

Methods: The review was conducted in accordance with the PRISMA 2020 guidelines and registered in PROSPERO (registration number CRD42022345678). The databases Scopus, PubMed, Web of Science, and EBSCO were searched up to 31 March 2025. Randomized controlled trials (RCTs) were included if they involved participants aged ≥60 years, a VR intervention lasting ≥6 weeks, and a control group performing traditional exercises or receiving usual care. Methodological quality was assessed using the PEDro scale, and a narrative synthesis was performed across four outcome domains: balance, mobility, cognitive function, and fall risk.

Results: Seven RCTs were included in the analysis (totaling 664 participants). VR training was found to be at least as effective as conventional exercise in improving balance (e.g., Berg Balance Scale) and mobility (e.g., Timed Up and Go), with some studies showing superior effects of VR. One RCT demonstrated that combining VR with balance exercises (MIX) yielded the greatest improvements in muscle strength and physical performance. Additionally, two studies reported cognitive benefits (e.g., MoCA) and a 42% reduction in fall incidence within six months following VR intervention. The methodological quality of the included studies was moderate to high (PEDro score 5-9/10).

Conclusions: VR-based training represents a safe and engaging supplement to geriatric rehabilitation, effectively improving balance, mobility, and, in selected cases, cognitive function, while also reducing fall risk.

Keywords: VR; elderly; fall risk; multicomponent training; training.

Effects of Immersive Virtual Reality on Physical Function, Fall-Related Outcomes, Fatigue, and Quality of Life in Older Adults: A Randomized Controlled Trial

Kasic Parmak D, Angın E, Iyigun G. Healthcare. 2025 Jul 24;13(15):1800d.

DOI: 10.3390/healthcare13151800 **PMID:** 40805833 **PMCID:** PMC12346243

Abstract

Background/Objectives: This study aimed to evaluate the impact of an immersive virtual reality (IVR) program on balance, physical fitness, risk of falling, fear of falling, fatigue, and quality of life in older adults compared with an active control group (ACG).

Methods: A total of 44 older adults were randomly assigned to either the IVR group (n = 22) or the ACG (n = 22) for an 8-week period. The IVR group participated in 35-min immersive virtual reality sessions three times a week, whereas the ACG followed a home-based traditional exercise program. Evaluations were conducted both before and after the intervention period.

Results: Compared with the ACG, the participants in the IVR group demonstrated significant improvements in balance, upper and lower extremity strength, lower extremity flexibility, fatigue levels, and specific aspects of quality of life such as autonomy and social participation. Treatment satisfaction was also higher in the IVR group.

Conclusions: An 8-week immersive virtual reality intervention was effective in improving physical function, reducing fatigue, and enhancing specific domains of quality of life among older adults.

Keywords: exercise therapy; fatigue; fear of falling; older adults; physical function; quality of life; risk of falling; virtual reality.

Effects of intrinsic foot muscle training combined with the lower extremity resistance training on postural stability in older adults: a randomised controlled trial

Lai Z, Cao M, Wang R, Zhong G, Gong P, Wang L. BMC Geriatr. 2025 Sep 29;25(1):732.

DOI: 10.1186/s12877-025-06407-5 **PMID:** 41023675

Abstract

Background: As the population ageing, the problem of increased incidence of falls and higher healthcare expenditure in the elderly will be further accentuating. Intrinsic foot muscles play an important role in postural control and its function is significantly associated with the risk of falls. Therefore, this study aimed to determine the effects of intrinsic foot muscle training on postural control in older adults.

Methods: A single-blind randomized controlled trial was conducted on 123 older participants. They were randomly divided into four groups, including short-foot combined the lower extremity resistance training group (SF-RT group), towel-curl training combined the lower extremity resistance training group (TC-RT group), lower extremity resistance training group (RT group) and control group. Three intervention groups performed resistance training and/or additional foot muscle training three times a week for 8weeks. The Sensory Organization, Limit of Stability, Motor Control tests were used to determine postural stability. The ergoFet dynamometer and colour Doppler ultrasound system were used to determine the foot muscle strength and morphology. Mobility was assessed using the Berg Balance Scale as well as the Timed Up and Go test. The multivariate of analysis for repeated measurements (MANOVA) test was used to determine the differences of these measurements.

Results: For postural stability, in Sensory Organization Test, compared to RT or the control groups, the SF-RT group had significant improvement at equilibrium, strategy and overall scores ($p < 0.05$). In the Limit of Stability test, there were significant differences in movement velocities between SF-RT and control groups ($p < 0.05$). Moreover, there were significant improvement at foot muscle strength and morphology found in SF-RT and TC-RT group.

Conclusion: Compared with regular intervention programme, additional short-foot training militated extra effect on improving static postural stability, mobility, foot muscle strength and morphology in the elderly.

Trial registration: This study has been registered at Chinese Clinical Trial Registry a priori as a clinical trial (ID ChiCTR2000033623) on June 7th, 2020.

Keywords: Aging; Fall prevention; Foot; Intrinsic foot muscle; Postural stability.

Scalability evaluation of a complex community-based falls prevention intervention in Australian stroke rehabilitation

Lin I, Day S, Dean CM, Clemson LM, Glinsky JV, Cusick A, Lannin NA, Scrivener K. BMJ Open. 2025 Sep 25;15(9):e093487.

DOI: 10.1136/bmjopen-2024-093487 **PMID:** 40998446

Abstract

Objectives: To investigate the scalability of the multi-component Falls After Stroke Trial (FAST) intervention tailored to community-dwelling adults with stroke to enable post-trial implementation.

Design: A mixed-methods formative evaluation of FAST data guided by the Reach, Effectiveness, Adoption, Implementation and Maintenance (RE-AIM) framework.

Setting: Community settings across three states in Australia.

Participants: Stroke participants were a subset of FAST trial participants (n=50) who were community-dwelling adults who had experienced a stroke up to 5 years prior and were at risk of falling. Therapists who delivered the intervention in the trial (interventionists) were physiotherapists and occupational therapists, trained in the FAST intervention.

Interventions: The FAST intervention is an individually tailored home safety and functional exercise programme designed to reduce falls and improve community mobility. It is offered over a 6-month period using 10 home visits, two telephone calls and programme resources, for example, manual and worksheets.

Primary and secondary outcome measures: Trial data, including interventionist training records and delivery data, resources and stroke participants' adherence data were used to assess the Adoption, Implementation and Maintenance dimensions of the RE-AIM framework.

Results: The FAST intervention was delivered by 22 interventionists. High implementation fidelity was shown with 90% of the stroke participants receiving FAST dose and content. Effective strategies supporting implementation included standardised programme resources, comprehensive pre-programme training, regular interventionist feedback and interventionist mentoring from experts. Online training and peer support networks will be required for scale up.

Conclusions: This study identifies how a complex intervention to prevent falls after stroke was successfully delivered. The AIM dimensions provided insights to FAST features essential for scale-up. Interventionist training, resources and mentoring/feedback were essential for adoption within the trial. Training and resources should be accessible in an online format for scale up (maintenance).

Trial registration number: ACTRN12619001114134.

Keywords: Behavior; Clinical trials; Implementation Science; REHABILITATION MEDICINE; Randomized Controlled Trial; Stroke.

Fall Risk Factors and Other Geriatric Syndromes in Older Adults With Diabetes: Experience of a Multidisciplinary Fall Consultation

Mailliez A, Chen Y, Litke R, Gloria S, Chekroud H, Huvent-Grelle D, Mirakovska L, Gaxatte C, Puisieux F. J Diabetes Res. 2025 Aug 21;2025:6145818.

DOI: 10.1155/jdr/6145818 **PMID:** 40893591 **PMCID:** PMC12393927

Abstract

Aims: The aim of this study is to assess the prevalence of diabetes in patients attending a multidisciplinary consultation for fall risk assessment and to compare fall risk factors and the prevalence of other geriatric syndromes in patients with and without diabetes.

Materials and Methods: A single-center retrospective cohort study was conducted at the Lille University Hospital Geriatrics Department, France. Inclusion criteria were any patients aged 65 years and over consulting for fall risk assessment between January 2, 2005, and January 2, 2015. A comprehensive multidisciplinary clinical evaluation was carried out to establish a personalized assessment of the patient's risk of falling.

Results: One thousand five hundred and twenty patients were included. Mean age was 81.4 ± 6.4 years; 72.2% were female, and 20% had diabetes. While patients with diabetes were younger than patients without diabetes (mean age: 79.4 ± 6.1 years vs. 81.9 ± 6.4 years, $p < 0.001$), they were more likely to have had at least two falls in the previous 6 months (65.5% vs. 56.2%; $p = 0.004$), had more balance and gait disorders (respectively, 77.4% vs. 69.7%, $p = 0.009$, and 88% vs. 82%, $p = 0.012$), and had more cognitive decline, urinary disorders, functional dependency, and polypharmacy than patients without diabetes ($p < 0.0001$ for all).

Conclusions: Patients with diabetes have more geriatric syndromes and comorbidities, leading to a higher risk of adverse events compared to patients without diabetes even if they are younger. Preventing falls and other geriatric syndromes should therefore be a concern for all healthcare professionals who care for people with diabetes.

Keywords: diabetes; falls; geriatric syndromes; older patients.

Postural Control Measures in Randomized Controlled Trials for Older Adults Balance: A Systematic Scoping Review

Pichon R, Enez J, Sibley KM, Landre B, Jamal K. Ann Geriatr Med Res. 2025 Sep;29(3):305-313.

DOI: 10.4235/agmr.25.0019 **PMID:** 41025272

Abstract

The aim of this work was to identify and characterize the measures employed for assessing postural control in randomized controlled trials (RCTs) of balance interventions in older adults with the reference to the Systems Framework for Postural Control. A scoping review was conducted, and RCTs of balance interventions in older adults published from 2013 to March 2023 were considered for inclusion. Two hundred and seventy-one studies were included with a total of 49 different measures used; the Timed Up and Go test being the most commonly employed. The median number of components of postural control assessed per study was five. The most frequently assessed components were motor systems and static stability, while reactive postural control, cognitive influences and verticality were the least frequently assessed. Postural control in RCTs of balance in older adults was assessed using a wide range of measures, but also from the perspective of a limited number of components.

Keywords: Aged; Health care outcome assessment; Postural balance.

Effects of Tai Chi Chuan on balance function in adults 60 years or older with type 2 diabetes and mild cognitive impairment in China: A secondary analysis of a multi-center randomized clinical trial

Qin J, Huang J, Liu J, Chen Y, Luo J, Tao L, Liu Z, Liu W, Xu Y, Liang S, Chen C, Tang Q, Chen Z, Chen S, Chen L, Tao J. J Diabetes Investig. 2025 Aug 18.

DOI: 10.1111/jdi.70138 **PMID:** 40820574

Abstract

Aims: To investigate the effect of Tai Chi Chuan on balance function in adults 60 years or older with type 2 diabetes and mild cognitive impairment (MCI) in China.

Materials and methods: This was a three-arm, parallel-group, randomized controlled trial with concealed allocation, assessor blinding, intention-to-treat (ITT), and per-protocol (PP) analysis. 328 adults 60 years or older, with a diagnosis of both type 2 diabetes and MCI, were randomly allocated into Tai Chi Chuan group, fitness walking group, and control group. All three groups were provided with a 30-min diabetes self-management education session, once every 4 weeks, for 24 weeks. In addition, the Tai Chi Chuan group received 24-form simplified Tai Chi Chuan. The fitness walking group received fitness walking training. Both Tai Chi Chuan and fitness walking groups took the training for 60 min/session, three times/week, for 24 weeks in a supervised setting. After completing the 24-week interventions, the participants were encouraged to continue exercise until the 36-week follow-up evaluation. The outcomes were time up and go (TUG) assessments, one leg standing test (OLST), functional reach test (FRT), grip strength, 5 time sit to stand test (5STS), modified fall efficacy scale (MFES), and falls data at baseline, 24 weeks, and 36 weeks follow-up.

Results: At 36 weeks, the Tai Chi Chuan group was significantly more effective in decreasing the TUG-cognitive-motor (mean difference, -0.72; 95% CI -1.37 to -0.06), OLST (eyes-closed, right leg) (mean difference, 1.02; 95% CI 0.24-1.80), FRT (mean difference, 2.00; 95% CI 0.57-3.42), 5STS (mean difference, -0.66; 95% CI -1.28 to -0.04), and MFES (mean difference, 0.36; 95% CI 0.15-0.56) compared with the fitness walking group. The Tai Chi Chuan group showed significantly fewer total falls during 36-week experimental period compared with the fitness walking group. PP analysis demonstrated similar results as the ITT analysis.

Conclusions: Among the older adults with type 2 diabetes and MCI, Tai Chi Chuan was more effective than fitness walking and control at improving balance function and reducing fall risk.

Keywords: Mild cognitive impairment; Tai Chi Chuan; Type 2 diabetes mellitus.

Postural balance and falls in older adults with asthma: a controlled cross-sectional study with follow-up

Schwambach B, de Lima FF, Pires PP, Agondi RC, Carvalho-Pinto RM, Carvalho CRF. J Asthma. 2025 Sep 9:1-13.

DOI: 10.1080/02770903.2025.2558760 **PMID:** 40924559

Abstract

Background: Postural balance is impaired in adults with asthma; however, this remains poorly understood in older people with asthma.

Objective: To assess postural balance and the incidence of falls in older individuals with moderate to severe asthma.

Methods: A controlled cross-sectional study with follow-up included individuals aged 65 to 80 years (asthma group,AG; n = 26) and without asthma (control group,CG; n = 27). The control group was matched by sex, age, and body mass index (BMI). The evaluations included comorbidities, fear of falling, muscle strength, and postural balance in different conditions. Subsequently, individuals received a fall diary and were followed up for six months.

Results: AG had more comorbidities, greater fear of falling, and consumed more medications ($p < 0.005$). AG also had worse postural balance assessed by the Mini-BESTest compared to the CG (23[18.0-25.0] vs. 24[21.00-26.00] score; $p = 0.03$). AG showed a greater CoP oscillation than CG at rest in natural base without foam(1.22 [0.78-1.94] vs. 0.88 [0.64-1.37]cm^2; $p = 0.04$) and at semi-tandem, post-exertion with foam (3.56[2.59-6.57] vs. 2.54[1.94-3.42]cm^2, $p = 0.006$). No between-group difference was observed in the predicted quadriceps and ankle dorsiflexor muscle strength ($p > 0.05$). Despite greater fear of falling and poorer balance, no group difference was observed in fall incidence over 6 months (08 vs. 10 falls) which may be partially explained by the follow-up period and the characteristics of the control group.

Conclusion: Our findings partially support the study hypothesis. Older adults with asthma exhibit impaired balance and an increased fear of falling, but this does not necessarily translate into a higher incidence of falls.

Keywords: accidental falls; asthma; older adults; postural balance.

Perceived knowledge and attitudes toward fall prevention among nurses and healthcare assistants: a Cross-Sectional survey study

Tana C, Di Risio A, Moffa S, Gallo C, di Nardo R, Palmieri M, Cipollone F, Racciatti D. Ann Med. 2025 Dec;57(1):2559127.

DOI: 10.1080/07853890.2025.2559127 **PMID:** 40970437 **PMCID:** PMC12451957

Abstract

Background: Falls are among the most common adverse events in hospitals, with major clinical and legal consequences. Despite existing prevention guidelines, fall-related incidents remain frequent, underscoring the need to evaluate healthcare workers' awareness and adherence to institutional protocols.

Aim of the study: To assess perceived knowledge, attitudes, and barriers to fall prevention among nurses and healthcare assistants, in order to identify gaps and inform targeted strategies.

Methods: A cross-sectional survey was conducted among 295 nurses and healthcare assistants across multiple departments of the ASL Lanciano Vasto Chieti, Italy. The self-administered questionnaire collected demographic data, knowledge, attitudes, perceived barriers, and awareness of institutional protocols. Data were analyzed using descriptive statistics, chi-square tests, ANOVA, and logistic regression ($p < 0.05$).

Results: Greater professional experience was significantly associated with participation in fall prevention training ($p < 0.005$). While most participants reported using fall risk assessment scales, uncertainties persisted regarding their limitations. Frequently cited barriers included limited availability of equipment and underreporting of incidents, often linked to incomplete procedural knowledge and poor dissemination of educational materials ($p < 0.0001$). Participation in training correlated with higher adherence to protocols and improved fall risk assessment practices ($p < 0.0001$).

Conclusions: Overall awareness of fall prevention was adequate, but variability in training, incident reporting, and resource access remain critical gaps. Reinforcing educational programs, ensuring consistent dissemination of materials, and fostering evidence-based, individualized strategies could enhance adherence to best practices and reduce fall-related events.

Keywords: Falls; healthcare assistants; nursing education; patient safety; prevention; risk management.

Digitally Delivered, Group-Based Exercise Interventions for Older Adults: Scoping Review

Wing D, Nichols JF, Parra MT, Barkai HS, Moran RJ. J Med Internet Res. 2025 Sep 3;27:e73578.

DOI: 10.2196/73578 **PMID:** 40902150

Abstract

Background: Falls and fractures are the leading cause of unintentional injury among older adults, resulting in increased mortality and morbidity, as well as reduced physical function and quality of life. In-person exercise programs aimed at improving strength, balance, and postural control have demonstrated benefits for physical function, quality of life, and fall risk reduction among older adults. Technology-driven approaches can further enhance the accessibility of exercise programs. In particular, digitally delivered programs offer the opportunity to balance risks and benefits while promoting engagement and potentially improving physical function.

Objective: The overall aim of this review was to summarize the growing body of research on the efficacy, usability, and safety of these programs in older adults.

Methods: MEDLINE via PubMed, the Cochrane Controlled Register of Trials (CENTRAL), and Embase databases were searched for this review. The initial search was conducted in November 2022 and updated in July 2024. Randomized controlled trials, nonrandomized trials, and single-arm pilot studies of at least 6 weeks' duration reporting digitally delivered exercise for presumptively healthy older adults, taught in real-time (not prerecorded) by a qualified instructor, were included. Interventions targeting specific clinical subpopulations (eg, cardiac rehabilitation, Parkinson disease, chronic obstructive pulmonary disease) were excluded, although common age-related conditions such as hypertension, diabetes, and osteoporosis were included. The review was preregistered via INPLASY (registration number 3773).

Results: A total of 4242 studies were screened by title and abstract, with 76 progressing to full-text review. Of these, 23 (30%) met all inclusion criteria, comprising 6 pilot single-arm studies, 5 nonrandomized trials, and 12 randomized trials. Interventions ranged from 6 to 24 weeks, with most lasting 8-12 weeks, and class participation typically occurred 2-3 days per week. Class sizes ranged from as few as 4 to more than 30 participants. Instructor experience varied and included licensed professionals, such as physical therapists, kinesiologists, and certified trainers, as well as laypeople specifically trained for the intervention. A total of 18 out of 23 (78%) studies reported physical outcomes, including balance, strength, and functional measures. Fourteen of these studies reported clinically meaningful improvements following the intervention, most commonly in strength and balance, measured by the 30-second chair stand test and the timed up and go; 20 studies (87%) reported 1 or more observations regarding safety or program usability. Among the studies that provided data on adverse events, most were conducted without injuries or reported only minor injuries. More than 60% of the authors (15/23, 65%) noted in their conclusion statements that participant acceptance of the digital delivery format was high.

Conclusions: Overall, these findings demonstrate partial effectiveness in improving physical function related to fall prevention among older adults. Additionally, high attendance, participant enjoyment, and safety highlight the utility of digitally delivered exercise programs for older adults taught in real time.

Trial registration: International Platform of Registered Systematic Review and Meta-analysis Protocols (INPLASY) INPLASY202280097; https://inplasy.com/inplasy-2022-8-0097/.

Keywords: Skype; Zoom; functional fitness; older adults; online instruction; physical training; strength, balance, fall prevention; videoconferencing.

Assessment of Fall Risk in Community-Dwelling Older Adults Using the Stopping Elderly Accidents, Deaths, and Injuries Algorithm

Yang K, Wingerden AV, Galagoza M, Soldevilla K, Lim EA, Wagner ML. Nurs Open. 2025 Sep;12(9):e70299.

DOI: 10.1002/nop2.70299 **PMID:** 40913487 **PMCID:** PMC12413634

Abstract

Aim: To identify individuals at risk of falls and the factors contributing to their risk, we screened community-dwelling older adults using the Centers for Disease Control and Prevention's Stopping Elderly Accidents, Deaths, and Injuries (STEADI) Assessments.

Design: A descriptive correlational study design.

Methods: Fall risk screenings with community-dwelling older adults aged 65 or older were conducted during a virtual interprofessional education event (IPE) for fall risk screening. The screening included demographic questions, perception of fall risks, medication questions and physical assessments (Timed Up and Go test, Single Leg test, 30-Second Sit to Stand) using the STEADI algorithm. Screening data were collected via Qualtrics, and descriptive data analyses were performed using SPSS.

Results: In total, 114 community volunteers aged 65 or older were screened for fall risk. Using the STEADI Fall Risk questionnaire, 84 participants (73.7%) exhibited at least one clinically proven risk factor for falls, with 39 (34.2%) having four or more risk factors. The physical assessments identified 37 participants (32.5%) with functional leg weakness, 47 (41.2%) had poor mobility and 32 (28.1%) had poor balance. As a result, the modified STEADI algorithm identified 68 (59.6%) with fall risk and the most frequently discussed SMART objectives were related to physical assessment data issues (34.5%).

Patient or public contribution: Our study confirmed the effectiveness of a multifaceted STEADI assessment in identifying community individuals at risk for falls who may not be detected through the normal standard of care. Educating nurses on performing comprehensive fall risk assessments and creating corresponding action plans with SMART objectives is essential to ensure thorough screening and care of their patients. A collaborative, interprofessional education programme can help train health professional students to gain valuable skills in conducting comprehensive fall risk screenings and developing objectives for future care plans based on those findings.

Enhancing Real-World Fall Detection Using Commodity Devices: A Systematic Study

Yasmin A, Mahmud T, Haque ST, Alamgeer S, Ngu AHH. Sensors. 2025 Aug 23;25(17):5249.

DOI: 10.3390/s25175249 **PMID:** 40942679 **PMCID:** PMC12431052

Abstract

The widespread adoption of smartphones and smartwatches has enabled non-intrusive fall detection through built-in sensors and on-device computation. While these devices are widely used by older adults, existing systems still struggle to accurately detect soft falls in real-world settings. There is a notable drop in performance when fall-detection models trained offline on labelled accelerometer data are deployed and tested in real-world conditions using streaming, real-time data. To address this, our experimental study investigates whether incorporating additional sensor modalities, specifically gyroscope data with accelerometer data from wrist and hip locations, can help bridge this performance gap. Through systematic experimentation, we demonstrated that combining accelerometer data from the hip and the wrist yields a model capable of achieving an F1-score of 88% using a Transformer-based neural network in offline evaluation, which is an improvement of 8% over a model trained solely on wrist accelerometer data. However, when it is deployed in an uncontrolled home environment with streaming real-time data, this model produced a high number of false positives. To address this, we retrained the model using feedback data that comprised both false positives and true positives and was collected from ten participants during real-time testing. This refinement yielded an F1-sore of 92% and significantly reduced false positives while maintaining comparable accuracy in detecting true falls in real-world settings. Furthermore, we demonstrated that the improved model generalizes well to older adults' movement patterns, with minimal false-positive detections.

Keywords: fall detection in the real world; fall detection with multiple sensors; optimizing fall-detection model.