

**Does living alone influence fall risk among Swiss older adults aged 60+? A pooled observational analysis of three RCTs on fall prevention**

Braendle K, Egli A, Bischoff-Ferrari H, Freystaetter G. *BMJ Open* 2024; 14(5): e081413.

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DOI: 10.1136/bmjopen-2023-081413

PMID: 38772577

**Abstract**

**OBJECTIVES:** Falling and living alone have been identified as public health challenges in an ageing society. Our study investigates whether living alone influences fall risk in community-dwelling older adults in Switzerland. **DESIGN AND METHODS:** Secondary analysis of three randomised controlled trials investigating how different doses of vitamin D and an exercise programme may influence the risk of further falls in people 60+ at risk of falling. We used logistic regression to examine the association between living alone and the odds of becoming a faller, and negative binomial regression to examine the association between living alone and the rate of falls. We assessed both any falls and falls with injury. All analyses were adjusted for sex, body mass index, age, grip strength, comorbidities, use of walking aids, mental health, trial and treatment group. Predefined subgroups were by sex and age.

**RESULTS:** Among 494 participants (63% women; mean age was 74.7±7.5 years) 643 falls were recorded over 936.5 person-years, including 402 injurious falls. Living alone was associated with a 1.76-fold higher odds of becoming a faller (OR (95% CI)=1.76 (1.11 to 2.79)). While the odds did not differ by sex, older age above the median age of 74.6 years increased the odds to 2.19-fold (OR (95% CI)=2.19 (1.11 to 4.32)). The rate of total or injurious falls did not differ by living status.

**CONCLUSIONS:** Community-dwelling older adults living alone have a higher odds of becoming a faller. The increased odds is similar for men and women but accentuated with higher age. **TRIAL REGISTRATION NUMBERS:** ZDPT: NCT01017354, NFP53: NCT00133640, OA: NCT00599807.

**Language:** en

**Keywords:** \*Accidental Falls/prevention & control/statistics & numerical data; \*Independent Living; Aged; Aged, 80 and over; Exercise Therapy/methods; Female; GERIATRIC MEDICINE; HEALTH ECONOMICS; Humans; Logistic Models; Male; Middle Aged; PUBLIC HEALTH; Randomized Controlled Trials as Topic; Risk Factors; Switzerland; Vitamin D/administration & dosage

## Walking on a balance beam as a new measure of dynamic balance to predict falls in older adults and patients with neurological conditions

Hortobagyi T, Vetrovsky T, Uematsu A, Sanders L, da Silva Costa AA, Batistela RA, Moraes R, Granacher U, Szabó-Kóra S, Csutorás B, Széphelyi K, Tollár J. *Sports Med.* Open 2024; 10(1): e59.

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DOI: 10.1186/s40798-024-00723-7

PMID: 38775922

### Abstract

**BACKGROUND:** Beam walking is a new test to estimate dynamic balance. We characterized dynamic balance measured by the distance walked on beams of different widths in five age groups of healthy adults (20, 30, 40, 50, 60 years) and individuals with neurological conditions (i.e., Parkinson, multiple sclerosis, stroke, age: 66.9 years) and determined if beam walking distance predicted prospective falls over 12 months.

**METHODS:** Individuals with ( $n = 97$ ) and without neurological conditions ( $n = 99$ , healthy adults, age 20-60) participated in this prospective longitudinal study. Falls analyses over 12 months were conducted. The summed distance walked under single (walking only) and dual-task conditions (walking and serial subtraction by 7 between 300 to 900) on three beams (4, 8, and 12-cm wide) was used in the analyses. Additional functional tests comprised grip strength and the Short Physical Performance Battery.

**RESULTS:** Beam walking distance was unaffected on the 12-cm-wide beam in the healthy adult groups. The distance walked on the 8-cm-wide beam decreased by 0.34 m in the 20-year-old group. This reduction was  $\sim 3 \times$  greater, 1.1 m, in the 60-year-old group. In patients, beam walking distances decreased sharply by 0.8 m on the 8 versus 12 cm beam and by additional 1.6 m on the 4 versus 8 cm beam. Beam walking distance under single and dual-task conditions was linearly but weakly associated with age ( $R(2) = 0.21$  for single task,  $R(2) = 0.27$  for dual-task). Age, disease, and beam width affected distance walked on the beam. Beam walking distance predicted future falls in the combined population of healthy adults and patients with neurological conditions. Based on receiver operating characteristic curve analyses using data from the entire study population, walking  $\sim 8.0$  of the 12 m maximum on low-lying beams predicted future fallers with reasonable accuracy.

**CONCLUSION:** Balance beam walking is a new but worthwhile measure of dynamic balance to predict falls in the combined population of healthy adults and patients with neurological conditions. Future studies are needed to evaluate the predictive capability of beam walking separately in more homogenous populations. Clinical Trial Registration Number NCT03532984.

**Language:** en

**Keywords:** Falls; Aging; Balance; Dual tasks; Gait

## **A protocol to determine the acceptability and feasibility of a pilot intervention emergency department virtual observation unit fall prevention program**

Jones AE, Kennedy M, Hayden EM, Ouchi K, N Shankar K, Chary A, Li A, Loughlin KM, White B, Franco-Garcia E, Dellheim V, Liu SW. *Pilot Feasibility Stud.* 2024; 10(1): e79.

(Copyright © 2024, Holtzbrinck Springer Nature Publishing Group - BMC)

**DOI:** 10.1186/s40814-024-01502-7

**PMID:** 38762531

### **Abstract**

**BACKGROUND:** As a third of all community dwellers aged 65+ fall each year, falls are common reasons for older adults to present to an Emergency Department (ED). Although EDs should assess patients' multifactorial fall risks to prevent future fall-related injuries, this frequently does not occur. We describe our protocol to determine the feasibility, acceptability, and safety of a pilot ED Virtual Observation Unit (VOU) Falls program.

**METHODS:** To ensure standardized conduct and reporting, the Standard Protocol Items for Intervention Trials (SPIRIT) guidelines will be used. The VOU is a program where patients are sent home from the ED but are part of a virtual observation unit in that they can call on-call ED physicians while they are being treated for conditions such as cellulitis, congestive heart failure, or pneumonia. A paramedic conducts daily visits with the patient and facilitates a telemedicine consult with an ED physician. VOU nursing staff conduct daily assessments of patients via telemedicine. The ED VOU Falls program is one of the VOU pathways and is a multi-component fall prevention program for fall patients who present after an ED visit. The paramedic conducts a home safety evaluation, a Timed Up and Go Test (TUG). During the VOU visit, the ED physician conducts a telemedicine visit, while the paramedic is visiting the home, to review patients' fall-risk-increasing drugs and their TUG test. We will determine feasibility by calculating rates of patient enrollment refusal, and adherence to fall-risk prevention recommendations using information from 3-month follow-up telephone calls, as well as qualitative interviews with the paramedics. We will determine the acceptability of the ED VOU Falls program based on patient and provider surveys using a Likert scale. We will ask VOU nursing staff to report any safety issues encountered while the patient is in the ED VOU Falls program (e.g., tripping hazards). We will use the chi-square test or Fisher's exact test for categorical variables, Student's t-test for continuous variables, and Mann-Whitney for nonparametric data. We will review interview transcripts and generate codes. Codes will then be extracted and organized into concepts to generate an overall theme following grounded theory methods. This is a pilot study; hence, results cannot be extrapolated. However, a definite trial would be the next step in the future to determine if such a program could be implemented as part of fall prevention interventions.

**DISCUSSION:** This study will provide insights into the feasibility and acceptability of a novel ED VOU Falls program with the aim of ultimately decreasing falls. In the future, such a program could be implemented as part of fall prevention interventions.

**Language:** en

**Keywords:** Falls; Feasibility; Geriatric; Transitions of care

## **Balance performance, falls-efficacy and social participation in patients with type 2 diabetes mellitus with and without vestibular dysfunction**

Komalasari DR, Vongsirinavarat M, Hiengkaew V, Nualnim N. PeerJ 2024; 12: e17287.

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DOI: 10.7717/peerj.17287

PMID: 38766481

PMCID: PMC11102735

### **Abstract**

**BACKGROUND:** The performance of balance is an important factor to perform activities. The complications of type 2 diabetes mellitus (T2DM), especially vestibular dysfunction (VD), could decrease balance performance and falls-efficacy (FE) which consequently impacts social participation and quality of life (QoL).

**PURPOSE:** This study aimed to compare balance performance, FE, social participation and QoL between individuals with T2DM with and without VD.

**METHODS:** The participants comprised 161 T2DM with VD and 161 without VD. Three clinical tests used for confirming VD included the Head Impulse Test (HIT), the Dix Hallpike Test (DHT) and the Supine Roll Test (SRT). The scores of static and dynamic balances, FE, social participation and QoL were compared between groups.

**RESULTS:** The balance performance, FE, social participation and QoL were lower in the group with VD. The number of patients who had severe social restriction was higher in T2DM with VD than without VD (58.4% vs 48.4%). Moreover, all domains of QoL (physical, psychological, social relationships and environmental) were lower in T2DM with VD than without VD.

**CONCLUSION:** The presence of VD in T2DM patients was associated with decreased physical balance performances and increased social and QoL disengagement. Comprehensive management related to balance and FE, as well as the monitoring to support social participation and QoL, should be emphasized in patients with T2DM with VD.

**Language:** en

**Keywords:** \*Accidental Falls/prevention & control; \*Diabetes Mellitus, Type 2/psychology/complications/physiopathology; \*Postural Balance/physiology; \*Quality of Life/psychology; \*Social Participation; \*Vestibular Diseases/physiopathology/psychology; Aged; Balance performance; Falls-efficacy; Female; Humans; Male; Middle Aged; Quality of life; Social participation; Type 2 diabetes mellitus; Vestibular dysfunction

## **Prevalence and risk factors for falls among older Chinese adults in the community: findings from the CLHLS study**

Liang H, Zhang Z, Lai H, Tian T. *Braz. J. Med. Biol. Res.* 2024; 57: e13469.

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**DOI:** 10.1590/1414-431X2024e13469      **PMID:** 38775548

### **Abstract**

Older adults have a high prevalence of falls due to a decline in physiological functions and various chronic diseases. This study aimed to investigate the prevalence of and risk factors for falls among older individuals in the Chinese Longitudinal Healthy Longevity Survey (CLHLS). We collected information from 9737 older individuals (average age=84.26 years) from the CLHLS and used binary logistic regression analysis to explore the independent risk factors and protective factors for falls. The logistic regression analysis results are reported as adjusted odds ratios (aORs) and 95% confidence intervals (95% CIs). The prevalence of falls among older adults in China was 21.6%, with women (24.6%) having a higher prevalence than men (18.1%). Logistic regression analysis revealed that never (or rarely) eating fresh fruit, difficulty with hearing, cataracts, and arthritis were the common independent risk factors for falls in older Chinese men and women. Among men, age  $\geq 80$  years (aOR=1.86), never doing housework (aOR=1.36), and dyslipidemia (aOR=1.47) were risk factors, while eating milk products once a week was a protective factor. Alcohol consumption (aOR=1.40), physical labor (aOR=1.28), and heart disease (aOR=1.21) were risk factors for falls in women, while a daily sleep duration of 6-12 h and garlic consumption once a week were protective factors. The prevalence of falls among older adults in China is 21.6% and is greater in women than in men. These risk and protective factors can be used to formulate reasonable recommendations for living habits, diet, and chronic disease control strategies.

**Language:** en

**Keywords:** Humans; Risk Factors; Aged; Female; Logistic Models; Male; Aged, 80 and over; Prevalence; Longitudinal Studies; East Asian People; China/epidemiology; \*Accidental Falls/statistics & numerical data

## **A comparison of changes in drug burden index between older inpatients who fell and people who have not fallen: a case-control study**

O'Leary CET, Wilkinson TJ, Hanger HC. *Australas. J. Ageing* 2024; ePub(ePub): ePub.

(Copyright © 2024, Australian Council on the Ageing, Publisher John Wiley and Sons)

**DOI:** 10.1111/ajag.13333

**PMID:** 38770595

### **Abstract**

**OBJECTIVE:** Older inpatients who fall are often frail, with multiple co-morbidities and polypharmacy. Although the causes of falls are multifactorial, sedating and delirium-inducing drugs increase that risk. The aims were to determine whether people who fell had a change in their sedative and anticholinergic medication burden during an admission compared to people who did not fall. A secondary aim was to determine the factors associated with change in drug burden.

**METHODS:** A retrospective, observational, case-control study of inpatients who fell. Two hundred consecutive people who fell were compared with 200 randomly selected people who had not fallen. Demographics, functional ability, frailty and cognition were recorded. For each patient, their total medications and anticholinergic and sedative burden were calculated on admission and on discharge, using the drug burden index (DBI).

**RESULTS:** People who fell were more dependent and cognitively impaired than people who did not fall. People who fell had a higher DBI on admission, than people who had not fall (mean: .69 vs.43, respectively,  $p < .001$ ) and discharge (.66 vs.38,  $p < .001$ ). For both cohorts, the DBI decreased between admission and discharge (-.03 and -.05), but neither were clinically significant. Higher total medications and a higher number DBI medications on admission were both associated with greater DBI changes ( $p = .003$  and  $< .001$ , respectively). However, the presence (or absence) of cognitive impairment, dependency, frailty and single vs multiple falls were not significantly associated with DBI changes.

**CONCLUSIONS:** In older people, DBI medications and falls are both common and have serious consequences, yet this study was unable to demonstrate any clinically relevant reduction in average DBI either in people who fell or people who had not fallen during a hospital admission.

**Language:** en

**Keywords:** aged; anticholinergics; sedatives

## **Reach, adoption, and implementation strategies of a telehealth fall prevention program: perspectives from francophone communities across Canada**

O'Neil J, Dionne N, Marchand S, Cardinal D, Handrigan G, Savard J. Health Promot. Pract. 2024; ePub(ePub): ePub.

(Copyright © 2024, Society for Public Health Education, Publisher SAGE Publishing)

**DOI:** 10.1177/15248399241252807

**PMID:** 38757965

### **Abstract**

**Introduction.** A fall may impact a person's physical, emotional, and psychological well-being. Fall prevention programs are being implemented to reduce these negative outcomes. However, linguistic barriers in health services may reduce access to such prevention programs. A telehealth fall prevention program was designed to increase access to such programs in French for Francophone minority communities in Canada. This capacity-building project aimed to support community partners to deliver this telehealth program and document strategies used to reach, adopt, and implement the program within various Francophone and Acadian Minority Communities.

**METHODS.** A sequential explanatory mixed methodology was used to document reach, adoption, and implementation strategies and describe the lived experiences of program facilitators and organization representatives. Reach, adoption, and implementation were documented and analyzed descriptively, while lived experiences were analyzed using content analysis following the Consortium Framework for Implementation Research.

**RESULTS.** Twelve organization representatives or program facilitators from eight organizations operating in four different provinces participated in the study. Three themes emerged from the qualitative data on reach and adoption: external context, internal context, and capacity building. Four themes were identified as barriers and facilitators to implementation: level of preparation and time management, interpersonal relations and telepresence, exercise facilitation and safety, and technological problem-solving.

**CONCLUSION.** Using tailored reach and adoption strategies such as prioritizing provinces with higher proportions of needs and training local community program facilitators may lead to the successful implementation of a new telehealth fall prevention program.

**RESULTS** from this study could potentially inform other primary prevention programs or telehealth program implementation.

**Language:** en

**Keywords:** access to health care; aging; community intervention; health promotion; technology

# Factors influencing the implementation of a fall prevention exercise program for community-dwelling older adults: a qualitative study guided by the PRECEDE-PROCEED Model

Ong RHS, Nurjono M, Oh HC, Lien CTC, Jumala J, Teo RCC, Gan P, Kan KLM, Rosle LF, Wee MK, Low SL. *Clin. Interv. Aging* 2024; 19: 857-871.

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DOI: 10.2147/CIA.S454043

PMID: 38770185

PMCID: PMC11104366

## Abstract

**PURPOSE:** Multiple falls preventions exercise programs have been rolled out globally, however, few studies have explored the factors necessary for their implementation. This study aimed to investigate the factors influencing the implementation of "Steady Feet" (SF), a 12-week community fall prevention exercise intervention, for older adults living in Singapore.

**MATERIAL AND METHODS:** This study utilized purposive sampling to recruit two participant groups: (i) older adults who declined or withdrew from the program and (ii) providers of the program (eg, instructors). We conducted 22 semi-structured interviews, recordings were transcribed and translated, followed by thematic analysis. Data collection and analysis were informed by the PRECEDE-PROCEED framework, focusing on predisposing, enabling, and reinforcing factors.

**RESULTS:** Findings revealed two predisposing, four enabling, and two reinforcing themes. Predisposing themes encompassed (i) knowledge, attitudes, and practices of older adults towards exercises and falls prevention, and (ii) perceptions and attitudes of providers towards SF. Both older adults and providers identified several enabling elements in implementing SF, emphasizing the significance of (i) accessibility, availability, and affordability. Providers highlighted (ii) tools and structural support for continual engagement, (iii) minimizing variations in capabilities through a competency development program, and (iv) fostering synergistic partnerships. Positive reinforcement included (i) the role of providers in engaging and promoting participation, (ii) family support, social networks, and (iii) incentives for older adults. Conversely, both groups highlighted negative reinforcements, including (iv) communication issues and (v) repetitive exercises, while providers specifically identified (vi) labor constraints as a deterrent for implementation.

**CONCLUSION:** Findings indicate that effective implementation necessitates a multifaceted approach. Promoting participation involves engaging instructors, emphasizing social bonds and family involvement, offering incentives, and providing subsidized or free classes. A competency development program proved effective in reducing variations in providers' capabilities. Strengthening community partnerships, with management support, was crucial for ensuring the availability and accessibility of falls prevention programs.

**Language:** en

**Keywords:** \*Accidental Falls/prevention & control; \*Exercise Therapy/methods; \*Independent Living; \*Qualitative Research;

Aged; Aged, 80 and over; community-dwelling; exercise; Exercise; falls prevention; Female; Health Knowledge, Attitudes, Practice; Humans; Interviews as Topic; Male; Middle Aged; older adults; precede-proceed; qualitative; Singapore

## **Physical activity components associated with gait parameters in community-dwelling older adults**

Porto JM, Pieruccini-Faria F, Bandeira ACL, Bôdo JS, Abreu DCC. J. Bodyw. Mov. Ther. 2024; 38: 67-72.

(Copyright © 2024, Elsevier Publishing)

**DOI:** 10.1016/j.jbmt.2023.11.064

**PMID:** 38763617

### **Abstract**

**OBJECTIVE:** To investigate the association between components of physical activity and spatiotemporal gait parameters in community-dwelling older adults.

**METHODS:** Cross-sectional study with 134 independent community-dwelling older adults. A questionnaire was applied to obtain information related to the components of physical activity (frequency, duration, modality, and history of physical activity in the life course) and the GAITRite System was used to quantify gait parameters. Three MANOVA models adjusted for potential confounders were conducted to identify associations between components of physical activity (predictors) and gait performance (outcome).

**RESULTS:** Higher weekly frequency but not daily hours of physical activity and sports practice (tennis, boxing, football, volleyball, and tai chi) were significantly associated with better gait performance, specifically gait speed and stride length.

**CONCLUSION:** Understanding the most effective components of physical activity to maintain functional capacity and independence in community-dwelling older adults, allowing for active aging, is essential for formulating more effective strategies.

**Language:** en

**Keywords:** \*Exercise/physiology; \*Gait/physiology; \*Independent Living; Active aging; Aged; Aged, 80 and over; Cross-Sectional Studies; Exercise; Female; Functional capacity; Gait speed; Humans; Male; Senescence; Sports/physiology; Walking Speed/physiology

## **Apolipoprotein $\epsilon$ 4 is associated with increased risk of fall- and fracture-related hospitalisation: the Perth Longitudinal Study of Ageing Women**

Pratt J, Dalla Via J, Sale C, Gebre AK, Stephan BCM, Laws S, Zhu K, Lim WH, Prince RL, Lewis JR, Sim M. J. Gerontol. A Biol. Sci. Med. Sci. 2024; ePub(ePub): ePub.

(Copyright © 2024, Gerontological Society of America)

DOI: 10.1093/gerona/glae134

PMID: 38766839

### **Abstract**

Apolipoprotein  $\epsilon$ 4 (APOE  $\epsilon$ 4) may be a genetic risk factor for reduced bone mineral density (BMD) and muscle function, which could have implications for fall and fracture risk. We examined the association between APOE  $\epsilon$ 4 status and long-term fall- and fracture-related hospitalisation risk in older women. 1276 community-dwelling women from the Perth Longitudinal Study of Ageing Women (mean age  $\pm$  SD = 75.2  $\pm$  2.7 years) were included. At baseline, women underwent APOE genotyping and detailed phenotyping for covariates including prevalent falls and fractures, as well as health and lifestyle factors. The association between APOE  $\epsilon$ 4 with fall-, any fracture-, and hip fracture-related hospitalisations, obtained over 14.5 years from linked health records, were examined using multivariable-adjusted Cox-proportional hazard models. Over 14.5 years, 507 (39.7%) women experienced a fall-related hospitalisation, 360 (28.2%) women experienced a fracture-related hospitalisation, including 143 (11.2%) attributed to a hip fracture. In multivariable-adjusted models, compared to non-carriers, APOE  $\epsilon$ 4 carriers (n=297, 23.3%) had greater risk for a fall- (HR 1.48 95%CI 1.22-1.81), fracture- (HR 1.28, 95%CI 1.01-1.63) or hip fracture-related hospitalisation (HR 1.83 95%CI 1.29-2.61). The estimates remained similar when specific fall and fracture risk factors (fear of falling, plasma 25-hydroxyvitamin D, grip strength, timed-up-and-go, hip BMD, vitamin K status, prevalent diabetes, HbA1c, cholesterol, abbreviated mental test score) were added to the multivariable model. In conclusion, APOE  $\epsilon$ 4 is a potential risk factor for fall- and fracture-related hospitalisation in community-dwelling older women. Screening for APOE  $\epsilon$ 4 could provide clinicians an opportunity to direct higher risk individuals to appropriate intervention strategies.

**Language:** en

**Keywords:** Community-dwelling; Injurious falls; Musculoskeletal; Women's health