Fall Risk Factors

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Falls


age 65+
age 72+
age 80+
1 out of 3 people falls each year
fall every two years
fall every year


What is the impact of a fall?
1 Physical injury
2 Hospitalisation
3 Loss of independence
4 Increased 'fear of falling'
5 Normal activity levels reduced
6 Deteriorating health and fitness
7 Social isolation, loneliness and depression

Causes of and Risk Factors for Falls

***Intrinsic factors**:* medical conditions, age-related conditions, age, gender, gait, fitness, balance, vertigo and dizziness, impaired vision and hearing, cognitive impairment, cardiovascular disease, medications and depression.

Extrinsic factors: Environmental factors present fall hazards in the home and external environment such as footwear and clothing, home lighting, flooring, tripping hazards, lack of grab bars, and unstable furniture.

Santy-Tomlinson, Julie, et al. "Falls and secondary fracture prevention." *Fragility Fracture Nursing: Holistic Care and Management of the Orthogeriatric Patient* (2018): 27-40.

Box 5.2 Risk Factors for Osteoporosis and Fragility Fractures: Non-Modifiable and Modifiable

Non-modifiable risk factors	Modifiable risk factors
Age	Alcohol use
Female gender	Smoking
Parents with a hip fracture	Low body mass index
Previous fracture	Poor nutrition with low calcium intake
Ethnicity	Vitamin D deficiency
Post-menopause	Eating disorders
Long-term glucocorticoid therapy	Oestrogen deficiency
Rheumatoid arthritis	Falls
Primary/secondary hypogonadism in men	Sedentary lifestyle

Hertz, Karen, and Julie Santy-Tomlinson. *Fragility Fracture and Orthogeriatric Nursing: Holistic Care and Management of the Fragility Fracture and Orthogeriatric Patient*. Springer Nature, 2024.

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The risk of falls among the aging population: A systematic review and meta-analysis

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Aim: This study aims to clarify the risk factors for falls to prevent severe consequences in older adults.

Methods: We searched the PubMed, Web of Science, Embase, and Google Scholar databases using the terms "risk factors" OR "predicting factors" OR "predictor" AND "fall" OR "drop" to identify all relevant studies and compare their results. The study participants were divided into two groups, the "fall group" and the "control group", and differences in demographic characteristics, lifestyles, and comorbidities were compared.

Results: We included 34 articles in the analysis and analyzed 22 factors. Older age, lower education level, polypharmacy, malnutrition, living alone, living in an urban area, smoking, and alcohol consumption increased the risk of falls in the aging population. Additionally, comorbidities such as cardiac disease, hypertension, diabetes, stroke, frailty, previous history of falls, depression, Parkinson's disease, and pain increased the risk of falls.

Conclusion: Demographic characteristics, comorbidities, and lifestyle factors can influence the risk of falls and should be taken into consideration.

KEYWORDS
age, malnutrition, fall, meta-analysis, rural

Introduction

By 2050, people older than 65 years are estimated to account for 16% of the population (1). Falls are a major public health problem, as approximately 28–35% of individuals aged ≥ 65 years experience falls each year. As the aging population increases, more individuals will be at risk of falling (2).Among older people, physical falls are events that adversely affect health and lead to disability and mortality (3, 4). Moreover, fall-associated economic burdens are substantial and continue to increase worldwide (4, 5). Even non-injury falls are associated with negative impacts, such as anxiety, depression, and decreased mobility, which greatly affect the quality of life (QOL) and aging trajectory. The most harmful consequences of injurious falls are hip fracture and brain damage (4). Research on the risk of falling has become increasingly important to maintain the health of older individuals (2).Early screening for the risk of fall that takes risk factors into account is needed. Many retrospective, cross-sectional, and longitudinal studies have examined fall prevalence, fall-related consequences, and risk factors for falls in older individuals. However, even though some reviews have

- 34 articles in the analysis and analyzed
- 22 factors.

were risk factors for falls

- Older age (MD 1.87; 95%CI 1.14–2.6; p < 0.00001)
- Number of drugs used (MD 0.36; 95% CI.19–0.52; p < 0.0001)
- polypharmacy (RR 1.06; 95% CI 1.03–1.09; p = 0.0002)
- Malnutrition (RR 1.4; 95% CI 1.19–1.64; p < 0.0001)
- living alone (RR 1.39; 95% CI 1.29–1.5; p < 0.00001)
- living in a rural area (RR 1.09; 95% CI 1.02–1.16; p = 0.006)
- smoking (RR 1.17; 95% CI 1.05–1.3; p = 0.004)
- Alcohol consumption (RR 1.18; 95% CI 1.09–1.28; p < 0.001)

Did not affect risk of falls

- BMI (MD -0.22; 95% CI -0.48–0.05; p= 0.11)
- sex (RR 1.02; 95% CI 1–1.04; p = 0.13)

Comorbidities were risk factors for falls

- Heart disease (RR 1.14; 95% CI 1.09–1.19; p < 0.00001)
- Hypertension (RR 1.08; 95% CI 1.03–1.12; p = 0.0004
- Frailty (RR 1.35; 95% CI 1.25–1.45; p < 0.00001)
- Fall history (RR 1.53; 95% CIn1.44–1.62; p < 0.00001)
- Depression (RR 4.34; 95% CI 4.02–4.68; p < 0.00001)
- Parkinson’s disease (RR 3.05; 95% CI 1.84–5.05; p < 0.0001)
- pain (RR 1.22; 95% CI 1.11–1.34; p < 0.0001)

Comorbidities not significant

- Diabetes (RR 1.08; 95% CI 0.87–1.34; p = 0.49)
- Stroke (RR 1.55; 95% CI 0.72–3.35; p = 0.26)
- Vision dysfunction(RR 1.24; 95% CI 0.91–1.69; p = 0.17
- Cognitive impairment (RR 1.11; 95% CI 0.88–1.39; p =0.37)

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Risk factors for falls among community-dwelling older adults: A systematic review and meta-analysis

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Background and objective: The prevalence of falls among older adults living in the community is ~30% each year. The impacts of falls are not only confined to the individual but also affect families and the community. Injury from a fall also imposes a heavy financial burden on patients and their families. Currently, there are different reports on the risk factors for falls among older adults in the community. A retrospective analysis was used in this study to identify risk factors for falls in community-dwelling older adults. This research aimed to collect published studies to find risk factors for falls in community-dwelling older adults.

Methods: We searched for literature from the founding of PubMed, EMBASE, the Cochrane Library, the Web of Science, the China National Knowledge Infrastructure (CNKI), the China Science and Technology Periodicals Database (VIP), and the Wanfang database until September 2022. The studies were selected using inclusion and exclusion criteria. We collected information from relevant studies to compare the impact of potential risk factors such as age, female gender, fear of falling, history of falls, unclear vision, depression, and balance disorder on falls among community-dwelling older adults.

Results: A total of 31 studies were included with 70,868 community seniors. A significant risk factor for falls in the community of older adults was dementia (2.01, 95% CI: 1.41–2.86), age (1.15, 95% CI: 1.09–1.22), female gender (1.52, 95% CI: 1.27–1.81), fear of falling (2.82, 95% CI: 1.68–4.74), history of falls (3.22, 95% CI: 1.98–5.23), vision unclear (1.56, 95% CI: 1.29–1.89), depression (1.23, 95% CI: 1.10–1.37), and balance disorder (3.00, 95% CI: 2.05–4.39).

Conclusion: This study provides preliminary evidence that falls among community-dwelling older adults are associated with factors such as age, female gender, fear of falling, history of falls, unclear vision, depression, and balance disorders. The results of this research may help improve clinician awareness, risk stratification, and fall prevention among community-dwelling older adults.

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- 31 studies were included with 70,868 community seniors.
- A significant risk factor :
- Dementia (OR,2.01, 95% CI: 1.41–2.86),
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Review article

Risk factors for recurrent falls in older adults: A systematic review with meta-analysis

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ABSTRACT

Older adults who fall recurrently (i.e., 2 or more falls/year) are at risk of functional decline and mortality. Understanding which risk factors for recurrent falls are most important will inform secondary fall prevention strategies that can reduce recurrent falls risk. Thus, we conducted a systematic review with meta-analysis to determine the relative risk of recurrent falls for different types of falls risk factors. MEDLINE, EMBASE, PsycINFO, and CINAHL databases were searched on April 25, 2019 (Prospero Registration: CRD42019118888). We included peer-reviewed prospective studies which examined risk factors that contributed to recurrent falls in adults aged ≥ 60 years. Using the falls risk classification system of Lord and colleagues, we classified each risk factor into one of the following domains: 1) balance and mobility; 2) environmental; 3) psychological; 4) medical; 5) medication; 6) sensory and neuromuscular; or 7) sociodemographic. We calculated the summary relative risk (RR) for each domain and evaluated the risk of bias and quality of reporting. Twenty-two studies were included in this systematic review and meta-analysis. Four domains predicted recurrent falls: balance and mobility (RR:1.32;95 % CI:[1.10, 1.59]), medication (RR:1.53;95 % CI:[1.11, 2.10]), psychological (RR:1.35;95 % CI:[1.03, 1.78]), and sensory and neuromuscular (RR:1.51;95 % CI:[1.18, 1.92]). Each of these four domains can be viewed as a marker of frailty. The risk of bias was low, and the study quality was high (minimum:19/22). Older adults with markers of frailty are up to 53 % more likely to experience recurrent falls. Strategies that identify and resolve frailty markers should be a frontline approach to preventing recurrent falls.

- 22 studies
- Classified risk factor :
- 1) balance and mobility; 2) environmental; 3) psychological; 4) medical; 5) medication; 6) sensory and neuromuscular; or 7)sociodemographic.
- **Four domains predicted recurrent falls:**
- Balance and mobility (RR:1.32;95 % CI:[1.10, 1.59])
- Medication (RR:1.53;95 % CI:[1.11, 2.10]),
- Psychological (RR:1.35;95 % CI:[1.03, 1.78])
- Sensory and neuromuscular (RR:1.51;95 % CI:[1.18, 1.92]).
- Older adults with frailty are up to 53 % more likely to experience recurrent falls.

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RESEARCH Open Access

The global prevalence of and risk factors for fear of falling among older adults: a systematic review and meta-analysis

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Abstract

Background As a common psychological problem among older adults, fear of falling was found to have a wide range prevalence in different studies. However, the global prevalence of it was unknown and a lack of the large sample confirmed its risk factors.

Objectives To report the global prevalence of fear of falling and to explore its risk factors among older adults for further developing precise interventions to systematically manage FOF.

Design A systematic review and meta-analysis was conducted by PRISMA guidelines.

Methods Searches were conducted in PubMed, Web of Science, EMBASE, the Cochrane Library and the manual search in August 20, 2022, updated to September 2, 2023. Observational studies published in English were included and two researchers independently screened and extracted the data. Fixed or random effects mode was used to estimate the pooled prevalence of and risk factors for fear of falling. Heterogeneity resources were analyzed by subgroup and sensitivity analysis. Publication bias was assessed through funnel plots, Egger's test and Begg's test.

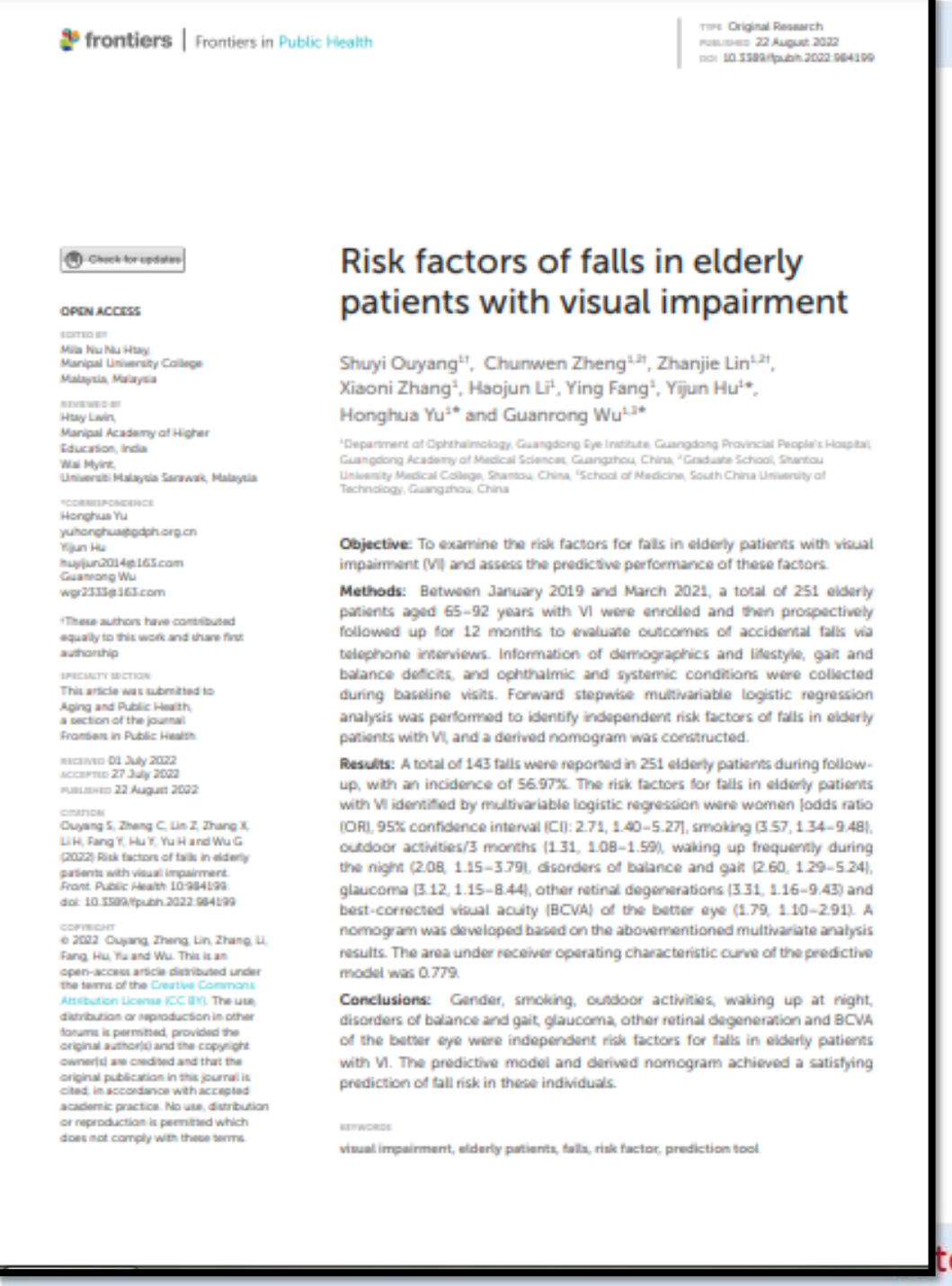
Results A total of the 153 studies with 200,033 participants from 38 countries worldwide were identified. The global prevalence of fear of falling was 49.60%, ranging from 6.96–90.34%. Subgroup analysis found the estimates pooled prevalence of it was higher in developing countries (53.40%) than in developed countries (46.7%), and higher in patients (52.20%) than in community residents (48.40%). In addition, twenty-eight risk factors were found a significant associations with fear of falling, mainly including demographic characteristics, physical function, chronic diseases and mental problems.

Conclusion The global prevalence of FOF was high, especially in developing countries and in patients. Demographic characteristics, Physical function, chronic diseases and mental problems were a significant association with FOF. Policy-makers, health care providers and government officials should comprehensively evaluate these risk factors and formulate precise intervention measures to reduce FOF.

Trial registration The study was registered in the International Database of Prospectively Registered Systematic Reviews (PROSPERO): CRD42022358031.

Keywords Fear of falling, Accidental Falls, Older adults, Geriatric nursing, Psychological nursing

- 153 studies with 200,033 participants from 38 countries worldwide
- The global prevalence of fear of falling was 49.60%, ranging from 6.96–90.34%.
- Subgroup analysis:
- Higher in developing countries (53.40%) than in developed countries (46.7%)
- Higher in patients (52.20%) than in community residents (48.40%).
- In addition, twenty-eight risk factors were found a significant associations with fear of falling, mainly including demographic characteristics, physical function, chronic diseases and mental problems.



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Risk factors of falls in elderly patients with visual impairment

Shuyi Ouyang[1†], Chunwen Zheng[1,2†], Zhanjie Lin[1,2†], Xiaoni Zhang[1], Haojun Li[1], Ying Fang[1], Yijun Hu[1*], Honghua Yu[1*] and Guanrong Wu[1,3*]

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Objective: To examine the risk factors for falls in elderly patients with visual impairment (VI) and assess the predictive performance of these factors.

Methods: Between January 2019 and March 2021, a total of 251 elderly patients aged 65–92 years with VI were enrolled and then prospectively followed up for 12 months to evaluate outcomes of accidental falls via telephone interviews. Information of demographics and lifestyle, gait and balance deficits, and ophthalmic and systemic conditions were collected during baseline visits. Forward stepwise multivariable logistic regression analysis was performed to identify independent risk factors of falls in elderly patients with VI, and a derived nomogram was constructed.

Results: A total of 143 falls were reported in 251 elderly patients during follow-up, with an incidence of 56.97%. The risk factors for falls in elderly patients with VI identified by multivariable logistic regression were women [odds ratio (OR), 95% confidence interval (CI): 2.71, 1.40–5.27], smoking (3.57, 1.34–9.48), outdoor activities/3 months (1.31, 1.08–1.59), waking up frequently during the night (2.08, 1.15–3.79), disorders of balance and gait (2.60, 1.29–5.24), glaucoma (3.12, 1.15–8.44), other retinal degenerations (3.31, 1.16–9.43) and best-corrected visual acuity (BCVA) of the better eye (1.79, 1.10–2.91). A nomogram was developed based on the abovementioned multivariate analysis results. The area under receiver operating characteristic curve of the predictive model was 0.779.

Conclusions: Gender, smoking, outdoor activities, waking up at night, disorders of balance and gait, glaucoma, other retinal degeneration and BCVA of the better eye were independent risk factors for falls in elderly patients with VI. The predictive model and derived nomogram achieved a satisfying prediction of fall risk in these individuals.

KEYWORDS
visual impairment, elderly patients, falls, risk factor, prediction tool

- A total of 143 falls were reported in 251 elderly patients during follow-up, with an incidence of 56.97%.
- The risk factors for falls in elderly patients with VI:
- Women [(OR), 95% confidence interval (CI): 2.71, 1.40–5.27]
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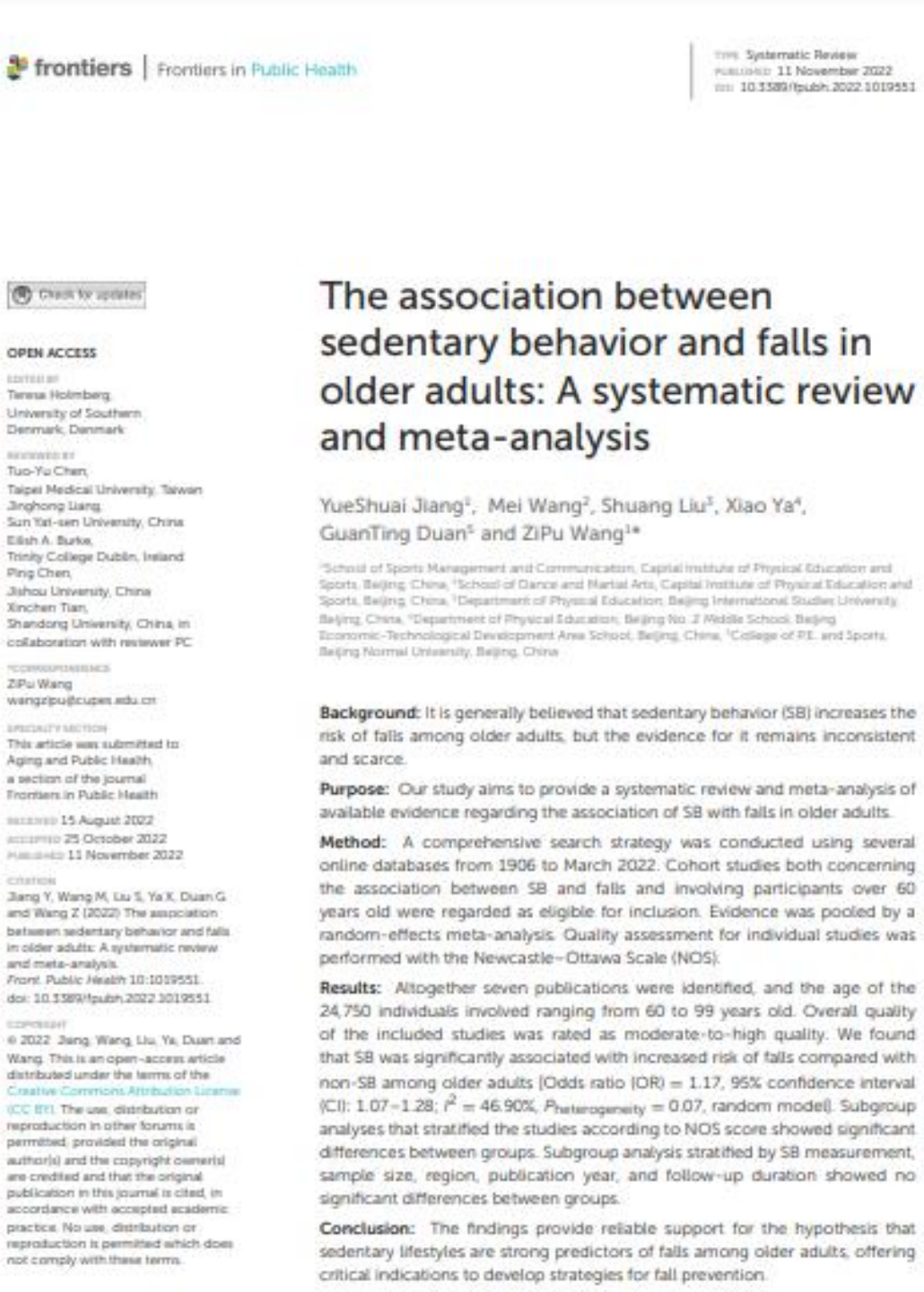
- Other retinal degenerations (3.31, 1.16–9.43)



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The association between sedentary behavior and falls in older adults: A systematic review and meta-analysis

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Background: It is generally believed that sedentary behavior (SB) increases the risk of falls among older adults, but the evidence for it remains inconsistent and scarce.

Purpose: Our study aims to provide a systematic review and meta-analysis of available evidence regarding the association of SB with falls in older adults.

Method: A comprehensive search strategy was conducted using several online databases from 1906 to March 2022. Cohort studies both concerning the association between SB and falls and involving participants over 60 years old were regarded as eligible for inclusion. Evidence was pooled by a random-effects meta-analysis. Quality assessment for individual studies was performed with the Newcastle–Ottawa Scale (NOS).

Results: Altogether seven publications were identified, and the age of the 24,750 individuals involved ranging from 60 to 99 years old. Overall quality of the included studies was rated as moderate-to-high quality. We found that SB was significantly associated with increased risk of falls compared with non-SB among older adults [Odds ratio (OR) = 1.17, 95% confidence interval (CI): 1.07–1.28; I^2 = 46.90%, $P_{heterogeneity}$ = 0.07, random model]. Subgroup analyses that stratified the studies according to NOS score showed significant differences between groups. Subgroup analysis stratified by SB measurement, sample size, region, publication year, and follow-up duration showed no significant differences between groups.

Conclusion: The findings provide reliable support for the hypothesis that sedentary lifestyles are strong predictors of falls among older adults, offering critical indications to develop strategies for fall prevention.

- Altogether seven publications were identified, and 24,750 individuals from 60 to 99 years old.
- Sedentary behavior was significantly associated with increased risk of falls compared with non-SB among older adults [Odds ratio (OR) = 1.17, 95% confidence interval (CI): 1.07–1.28;

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Review Article

Pain Is Associated With Poor Balance in Community-Dwelling Older Adults: A Systematic Review and Meta-analysis

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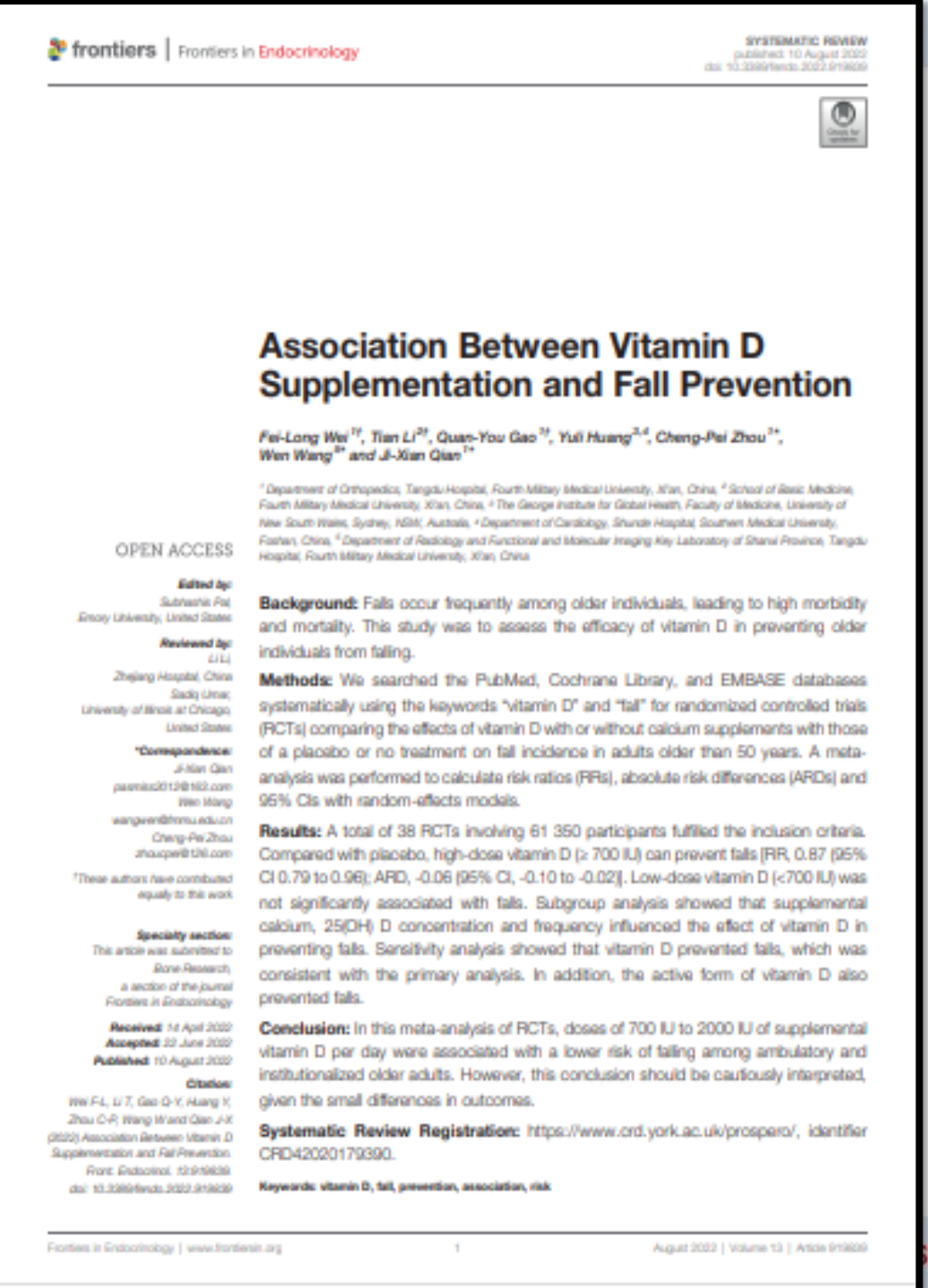
ABSTRACT

Objectives: Pain is a risk factor for falls in older adults, but the mechanisms are not well understood, limiting our ability to implement effective preventive strategies. The aim of this study was to systematically review and synthesize the literature that has examined the impact of pain on static, dynamic, multicomponent, and reactive balance in community-dwelling older adults.
Design: Systematic review and meta-analysis.
Setting and Participants: Studies from inception to March 2019 were identified from electronic databases (MEDLINE, EMBASE, PsycINFO, CINAHL), contact with the primary authors, and reference lists of included articles.
Methods: Cross-sectional and case-control studies that compared objective balance measures between older (minimum age 60 years) adults with and without pain were included.
Results: Thirty-nine eligible studies (n = 17,626) were identified. All balance modalities (static, dynamic, multicomponent, and reactive) were significantly poorer in participants with pain compared to those without pain. Subgroup analyses revealed that chronic pain (pain persisting ≥3 months) impaired balance more than pain of unspecified duration. The effects of pain at specific sites (neck, lower back, hip, knee, and foot) on balance were not significantly different.
Conclusions and Implications: Pain is associated with poor static, dynamic, multicomponent, and reactive balance in community-dwelling older adults. Pain in the neck, lower back, hip, knee, and foot all contribute to poor balance, and this is even more pronounced for chronic pain. Comprehensive balance and pain characteristic assessments may reveal mechanisms underlying the contribution of pain to instability and increased fall risk in older people.

- 39 eligible studies (n = 17,626)
- All balance modalities (static, dynamic, multicomponent, and reactive) were significantly poorer in participants with pain compared to those without pain.
- Subgroup analyses revealed that chronic pain (pain persisting 3 months) impaired balance more than pain of unspecified duration.



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Association Between Vitamin D Supplementation and Fall Prevention

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Wei F-L, Li T, Gao Q-Y, Huang Y, Zhou C-P, Wang W and Qian J-X (2022) Association Between Vitamin D Supplementation and Fall Prevention. Front. Endocrinol. 13:919839. doi: 10.3389/fendo.2022.919839

Background: Falls occur frequently among older individuals, leading to high morbidity and mortality. This study was to assess the efficacy of vitamin D in preventing older individuals from falling.

Methods: We searched the PubMed, Cochrane Library, and EMBASE databases systematically using the keywords "vitamin D" and "fall" for randomized controlled trials (RCTs) comparing the effects of vitamin D with or without calcium supplements with those of a placebo or no treatment on fall incidence in adults older than 50 years. A meta-analysis was performed to calculate risk ratios (RRs), absolute risk differences (ARDs) and 95% CIs with random-effects models.

Results: A total of 38 RCTs involving 61 350 participants fulfilled the inclusion criteria. Compared with placebo, high-dose vitamin D (≥ 700 IU) can prevent falls [RR, 0.87 (95% CI 0.79 to 0.96); ARD, -0.06 (95% CI, -0.10 to -0.02)]. Low-dose vitamin D (<700 IU) was not significantly associated with falls. Subgroup analysis showed that supplemental calcium, 25(OH) D concentration and frequency influenced the effect of vitamin D in preventing falls. Sensitivity analysis showed that vitamin D prevented falls, which was consistent with the primary analysis. In addition, the active form of vitamin D also prevented falls.

Conclusion: In this meta-analysis of RCTs, doses of 700 IU to 2000 IU of supplemental vitamin D per day were associated with a lower risk of falling among ambulatory and institutionalized older adults. However, this conclusion should be cautiously interpreted, given the small differences in outcomes.

Systematic Review Registration: https://www.crd.york.ac.uk/prospero/, identifier CRD42020179390.

Keywords: vitamin D, fall, prevention, association, risk

- RCTs comparing the effects of vitamin D with or without calcium supplements on fall incidence in adults older than 50 years.
- Total of 38 RCTs involving 61 350
- .Compared with placebo, high-dose vitamin D (≥ 700 IU) can prevent falls [RR, 0.87 (95% CI 0.79 to 0.96
- High doses of vitamin D reduced the risk of falls in older individuals by 13%, and the number needed to treat was 17 (95% CI, 10 to 50).
- However, there was no significant association of low-dose vitamin D with falling (RR, 1.09 [95% CI, 0.90 to 1.32]

RESEARCH Open Access

Effectiveness of fall prevention interventions in residential aged care and community settings: an umbrella review

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Abstract

Introduction Preventing falls is a priority for aged care providers. Research to date has focused on fall prevention strategies in single settings (e.g., residential aged care (RAC) or community settings). However, some aged care providers deliver care, including fall prevention interventions, across RAC and community settings. We conducted an umbrella review to identify what type of fall prevention interventions had the greatest impact on falls outcomes in RAC and community settings.

Methods Five databases were searched for systematic reviews of falls prevention randomised control trials in older adults living in the community or RAC. Data extracted included systematic review methods, population characteristics, intervention characteristics, setting details (RAC or community), and fall-related outcomes (falls, people who have had a fall, fall-related hospitalisations, and fall-related fractures). Review quality was appraised using the Assessment of Multiple Systematic Reviews-2 tool.

Results One-hundred and six systematic reviews were included; 63 and 19 of these stratified results by community and RAC settings respectively; the remainder looked at both settings. The most common intervention types discussed in reviews included 'exercise' (61%, *n* = 65), 'multifactorial' (two or more intervention types delivered together) (26%, *n* = 28), and 'vitamin D' (18%, *n* = 19). In RAC and community settings, 'exercise' interventions demonstrated the most consistent reduction in falls and people who have had a fall compared to other intervention types. 'Multifactorial' interventions were also beneficial in both settings however demonstrated more consistent reduction in falls and people who fall in RAC settings compared to community settings. 'Vitamin D' interventions may be beneficial in community-dwelling populations but not in RAC settings. It was not possible to stratify fall-related hospitalisation and fall-related fracture outcomes by setting due to limited number of RAC-specific reviews (*n* = 3 and 0 respectively).

Conclusion 'Exercise' interventions may be the most appropriate falls prevention intervention for older adults in RAC and community settings as it is beneficial for multiple fall-related outcomes (falls, fall-related fractures, and people who have had a fall). Augmenting 'exercise' interventions to become 'multifactorial' interventions may also improve the incidence of falls in both settings.

Keywords Falls, Aged care, Community, Vitamin D, Multifactorial, Exercise, Older adults

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- 106 systematic reviews were included; 63 and 19 of these stratified results by community and RAC settings respectively.
- The most common intervention types discussed in reviews included 'exercise' (61%, n=65), 'multifactorial' (two or more intervention types delivered together) (26%, n=28), and 'vitamin D' (18%, n=19).

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Result

- A dose response was proposed in several exercise and medication related reviews; for example, high vitamin D (> 800 IU per day) [32], > 3 hours of exercise per week [35], and intervention length (< 6 months and < 1 year) [32] may have a greater impact on fall incidence reduction.

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Take home massage

- Falls are multifactorial and research has reported numerous causes and risk factors in older people

- Timely and comprehensive assessment is essential in understanding the needs of older people and ensuring that their needs are met through care and treatment.
- Early Intervention

Thanks for Listening with great patience