

Safety Literature 20th March 2022

Fall arrest strategy training improves upper body response time compared to standard fall prevention exercise in older women: a randomized trial

Arnold CM, Lanovaz J, Farthing JP, Legg H, Weimer M, Kim S. Clin. Rehabil. 2022; ePub(ePub): ePub.

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DOI 10.1177/02692155221087963 PMID 35287479

Abstract

INTRODUCTION: Exercise can decrease fall risk in older adults but less is known about training to reduce injury risk in the event a fall is unavoidable. The purpose of this study was to compare standard fall prevention exercises to novel Fall Arrest Strategy Training (FAST); exercises designed to improve upper body capacity to reduce fall-injury risk in older women.

METHOD: Forty women (mean age 74.5 years) participated in either Standard (n = 19) or FAST (n = 21) twice per week for 12 weeks. Both interventions included lower body strength, balance, walking practice, agility and education. FAST added exercises designed to enhance forward landing and descent control such as upper body strengthening, speed and practice of landing and descent on outstretched hands.

RESULTS: Both FAST and Standard significantly improved strength, mobility, balance, and fall risk factors from pre to post-intervention. There was a significant time by group interaction effect for upper body response time where FAST improved but Standard did not (p = 0.038).

DISCUSSION: FAST resulted in similar gains in factors that reduce fall risk as a standard fall prevention program; with the additional benefit of improving speed of arm protective responses; a factor that may help enhance landing position and reduce injury risks such as head impact during a forward fall.

Language: en

Keywords

Physical activity; consequences of falling; head injury; movement time; muscle strength

Falls and potential therapeutic interventions among elderly and older adult patients with cancer: a systematic review

Abdelbasset WK, Nambi G, Elsayed SH, Osailan AM, Eid MM. Afr. Health Sci. 2021; 21(4): 1776-1783.

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DOI 10.4314/ahs.v21i4.34 **PMID** 35283949

Abstract

OBJECTIVES: The aim of this study was to perform a systematic review for previous publications that have assessed the incidence, risk factors, and favorable procedures to prevent and manage falls among cancer survivors of elderly and older adults. **MATERIALS:** This systematic review was undertaken using PubMed, SCOPUS, Web of Science, Medline, and Cochrane Database of clinical studies and systematic reviews to determine the incidence, risk factors, favorable inpatient and outpatient management, and non-pharmacological interventions for falls among elderly and older adult patients with cancer from 2010 to October, 2020.

RESULTS: After the comprehensive screening, clinical studies, meta-analysis, systematic reviews, and established guidelines were included in this review. Only 5 clinical studies (3 randomized and 2 single-arm studies), 5 systematic reviews, and 6 established guidelines were considered eligible. The five systematic reviews provide risk factors of falls and the 6 guidelines provide assessment & prevention modalities of falls, however, the 6 clinical studies provide the non-pharmacological intervention for falling among cancer survivors. Many factors associated are demonstrated among wide range of elderly individuals. Earlier falls were reliably listed as an important risk factor of falls in the two inpatient and outpatient environments including both general older people and geriatric cancer populations.

CONCLUSIONS: This review concludes that the assessment of falls among older individuals with cancer is the most important way for determining who could need additional observation and treatment program. Health professions involving physical therapy and occupational therapy have an important function for promoting health well-being in elderly and older adults with cancer.

Language: en

Keywords

elderly; risk factors; older adults; intervention; Cancer; falls

Fear of falling does not influence dual-task gait costs in people with Parkinson's disease: a cross-sectional study

Prell T, Uhlig M, Derlien S, Maetzler W, Zipprich HM. *Sensors* (Basel) 2022; 22(5): 2029.

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DOI 10.3390/s22052029 PMID 35271176

Abstract

Cognitive deficits and fear of falling (FOF) can both influence gait patterns in Parkinson's disease (PD). While cognitive deficits contribute to gait changes under dual-task (DT) conditions, it is unclear if FOF also influences changes to gait while performing a cognitive task. Here, we aimed to explore the association between FOF and DT costs in PD, we additionally describe associations between FOF, cognition, and gait parameters under single-task and DT. In 40 PD patients, motor symptoms (MDS-revised version of the Unified Parkinson's Disease Rating Scale, Hoehn and Yahr), FOF (Falls Efficacy Scale International), and Montreal Cognitive Assessment (MoCA) were assessed. Spatiotemporal gait parameters were recorded with a validated mobile gait analysis system with inertial measurement units at each foot while patients walked in a 50 m hallway at their preferred speed under single-task and DT conditions. Under single-task conditions, stride length ($\beta = 0.798$) and spatial variability ($\beta = 0.202$) were associated with FOF (adjusted $R(2) = 0.19$, $p < 0.001$) while the MoCA was only weakly associated with temporal variability (adjusted $R(2) = 0.05$, $p < 0.001$). Under DT conditions, speed, stride length, and cadence decreased, while spatial variability, temporal variability, and stride duration increased with the largest effect size for speed. DT costs of stride length ($\beta = 0.42$) and age ($\beta = 0.58$) explained 18% of the MoCA variance. However, FOF was not associated with the DT costs of gait parameters. Gait difficulties in PD may exacerbate when cognitive tasks are added during walking. However, FOF does not appear to have a relevant effect on dual-task costs of gait.

Language: en

Keywords

Parkinson's disease; dual-task; fear of falling; mobile gait analysis; stride length

Frailty syndrome-fall risk and rehabilitation management aided by virtual reality (VR) technology solutions: a narrative review of the current literature

Zak M, Sikorski T, Wasik M, Courteix D, Dutheil F, Broła W. *Int. J. Environ. Res. Public Health* 2022; 19(5): e2985.

(Copyright © 2022, MDPI: Multidisciplinary Digital Publishing Institute)

DOI 10.3390/ijerph19052985 **PMID** 35270677

Abstract

Frailty, a physiological syndrome (FS) affecting primarily the older adults, manifests itself through significantly depleted bodily reserves, and appreciably higher (up to over threefold) individual exposure to fall risk. Concomitant medical conditions such as balance impairment, reduced visual acuity, limited mobility, and significantly diminished daily functional performance further exacerbate the patients' condition. Their resultant susceptibility to frequent hospitalisations makes their prognosis even worse. This narrative review aimed to provide an overview of published studies focused on rehabilitation management approaches aided by virtual reality (VR) technology in frail older adults. The authors had it also augmented with their own, evidence-based body of experience in rehabilitation. Making use of technologically advanced exercise machinery, specially adapted for rehabilitating frail older adults, combined with a structured exercise regimen, further aided by the application of select virtual reality (VR) technology solutions, clearly proved effective. Consequently, the patients were helped to move back from the frail to the pre-frail stage, as well as had their motor and cognitive functions appreciably enhanced. The application of modern technology in rehabilitating older adults over 65, affected by FS, when specifically aided by the select VR technology solutions, was also proven to complement successfully the conventional rehabilitation management. The overall versatility of the VR technology solutions, e.g., adaptation for home use allowing remote supervision, also makes this novel approach to rehabilitation far more appealing to the patients. They find it both very attractive and far more mentally engaging. Its considerable potential lies mostly in being appreciably more effective in bringing in desirable therapeutic outcomes.

Language: en

Keywords

elderly; fall risk; exergaming; frailty syndrome (FS); rehabilitation strategies; seniors; telerehabilitation; virtual reality (VR) technology

Interventions for social isolation in older adults who have experienced a fall: a systematic review

Tricco AC, Thomas SM, Radhakrishnan A, Ramkissoon N, Mitchell G, Fortune J, Jiang Y, de Groh M, Anderson K, Barker J, Gauthier-Beaupré A, Watt J, Straus SE. *BMJ Open* 2022; 12(3): e056540.

(Copyright © 2022, BMJ Publishing Group)

DOI 10.1136/bmjopen-2021-056540 **PMID** 35264363

Abstract

OBJECTIVES: The objective of our systematic review was to identify the effective interventions to prevent or mitigate social isolation and/or loneliness in older adults who experienced a fall.

DESIGN: Systematic review. **DATA SOURCES:** MEDLINE, Embase, the Cochrane Central Register of Controlled Trials and Ageline were searched (from inception to February 2020).

METHODS: Studies were eligible if they described any intervention for social isolation in older adults living in a community setting who experienced a fall, and reported outcomes related to social isolation or loneliness. Two independent reviewers screened citations, abstracted data and appraised risk of bias using the Cochrane risk of bias tool. The results were summarised descriptively.

RESULTS: After screening 4069 citations and 55 full-text articles, four studies were included. The four studies varied in study design, including a randomised controlled trial, non-randomised controlled trial, an uncontrolled before-after study and a quasiexperimental study. Interventions varied widely, and included singing in a choir, a patient-centred, interprofessional primary care team-based approach, a multifactorial assessment targeting fall risk, appropriate medication use, loneliness and frailty, and a community-based care model that included comprehensive assessments and multilevel care coordination. Outcome measures varied and included scales for loneliness, social isolation, social interaction, social networks and social satisfaction. Mixed results were found, with three studies reporting no differences in social isolation or loneliness after the intervention. Only the multifactorial assessment intervention demonstrated a small positive effect on loneliness compared with the control group after adjustment ($B=-0.18$, 95% CI -0.35 to -0.02).

CONCLUSIONS: Few studies examined the interventions for social isolation or loneliness in older adults who experienced a fall. More research is warranted in this area. PROSPERO REGISTRATION NUMBER: CRD42020198487.

Language: en

Keywords

preventive medicine; geriatric medicine; rehabilitation medicine

Modifiable intrinsic factors related to occupational falls in older workers

Osuka Y, Okubo Y, Nofuji Y, Sasai H, Seino S, Maruo K, Fujiwara Y, Oka H, Shinkai S, Lord SR, Kim H. *Geriatr. Gerontol. Int.* 2022; ePub(ePub): ePub.

(Copyright © 2022, Japan Geriatrics Society, Publisher John Wiley and Sons)

DOI 10.1111/ggi.14370 PMID 35266260

Abstract

AIM: Identification of modifiable intrinsic factors for occupational falls is required for initiating effective fall prevention strategies for older workers. This study aimed to identify modifiable intrinsic factors related to falls during occupational activities among older workers.

METHODS: This retrospective study involved 1164 older workers (aged ≥ 60 years, workdays ≥ 4 /month) sampled from 18 public employment agencies for seniors in Saitama, Japan. Participants were assessed regarding the following 10 modifiable intrinsic factors: multimorbidity, polypharmacy, fall-risk-increasing medication use, self-rated vision and hearing, functional strength, bilateral stepping, standing balance, executive function and visuospatial ability. The number of falls during occupational activities in the past year was also recorded.

RESULTS: In total, 111 falls occurred in 73 of the 1164 participants during occupational activities in the past year. A negative binomial regression model showed that use of fall-risk-increasing medications (incidence rate ratio [IRR]: 2.23, 95% confidence interval [CI]: 1.08, 4.60, $P = 0.031$), reduced functional strength (IRR: 1.81, 95% CI: 1.02, 3.21, $P = 0.042$), poor standing balance (IRR: 1.83, 95% CI: 1.09, 3.09, $P = 0.023$) and poor visuospatial ability (IRR: 1.56, 95% CI: 1.03, 2.36, $P = 0.034$) were independently associated with occupational falls.

CONCLUSIONS: Our findings suggest that the assessment of medication use, functional strength, standing balance and visuospatial ability in regular health checks in the workplace may be useful for screening older workers at risk of occupational falls. *Geriatr Gerontol Int* 2022; ••: ••-••.

Language: en

Keywords

aged; cognitive function; accidental falls; occupational health; motor function

Over half of falls were associated with psychotropic medication use in four nursing homes in Japan: a retrospective cohort study

Oya N, Ayani N, Kuwahara A, Kitaoka R, Omichi C, Sakuma M, Morimoto T, Narumoto J. *Int. J. Environ. Res. Public Health* 2022; 19(5): e3123.

(Copyright © 2022, MDPI: Multidisciplinary Digital Publishing Institute)

DOI 10.3390/ijerph19053123 **PMID** 35270813

Abstract

Medication use can increase the risk of falls and injuries in nursing homes, creating a significant risk for residents. We performed a retrospective cohort study over one year to identify the incidence of drug-related falls with and without injury among four Japanese nursing homes with 280 beds. We evaluated the relationship between potential risk factors for falls and fall-related injuries while considering well-known risks such as ADLs and chronic comorbidities. By collaboratively reviewing care records, we enrolled 459 residents (mean age, 87) and identified 645 falls, including 146 injurious falls and 16 severe injurious falls requiring inpatient care, incidence: 19.5, 4.4, 0.5 per 100 resident-months, respectively. Medication influenced around three-quarters of all falls, >80% of which were psychotropic drugs. Regularly taking ≥ 5 medications was a risk factor for the initial falls (HR 1.33: CI 1.00-1.77, $p = 0.0048$) and injuries after falls (OR 2.41: CI 1.30-4.50, $p = 0.006$). Our findings on the incidence of falls with and without injury were similar to those in Western countries, where the use of psychotropic medication influenced >50% of falls. Discontinuing unnecessary medication use while simultaneously assessing patient ADLs and comorbidities with physicians and pharmacists may help to avoid falls in nursing homes.

Language: en

Keywords

dementia; psychotropic drugs; nursing home; adverse drug event; fall; polypharmacy

Predictive validity of the Stopping Elderly Accidents, Deaths & Injuries (STEADI) program fall risk screening algorithms among community-dwelling Thai elderly

Loonlawong S, Limroongreungrat W, Rattananupong T, Kittipimpanon K, Saisanan Na Ayudhaya W, Jiamjarasrangi W. *BMC Med.* 2022; 20(1): e78.

(Copyright © 2022, Holtzbrinck Springer Nature Publishing Group - BMC)

DOI 10.1186/s12916-022-02280-w PMID 35282818

Abstract

BACKGROUND: Fall risk screening using multiple methods was strongly advised as the initial step for preventing fall. Currently, there is only one such tool which was proposed by the U.S. Centers for Disease Control and Prevention (CDC) for use in its Stopping Elderly Accidents, Death & Injuries (STEADI) program. Its predictive validity outside the US context, however, has never been investigated. The purpose of this study was to determine the predictive validity (area under the receiver operating characteristic curve: AUC), sensitivity, and specificity of the two-step sequential fall-risk screening algorithm of the STEADI program for Thai elderly in the community.

METHODS: A 1-year prospective cohort study was conducted during October 2018-December 2019. Study population consisted of 480 individuals aged 65 years or older living in Nakhon Ratchasima Province, Thailand. The fall risk screening algorithm composed of two serial steps. Step 1 is a screening by the clinician's 3 key questions or the Thai Stay Independent brochure (Thai-SIB) 12 questions. Step 2 is a screening by 3 physical fitness testing tools including Time Up and Go test (TUG), 30-s Chair Stand, and 4-stage balance test. Participants were then followed for their fall incidents. Statistical analyses were conducted by using Cox proportional hazard model. The AUC, sensitivity, specificity, and other relevant predictive validity indices were then estimated.

RESULTS: The average age of the participants was 73.3 ± 6.51 years (range 65-95 years), and 52.5% of them were female. The screening based on the clinician's 3 key questions in Step 1 had a high AUC (0.845), with the sensitivity and specificity of 93.9% (95% CI 88.8, 92.7) and 75.0% (95% CI 70.0, 79.6), respectively. Appropriate risk categorization however differed slightly from the original STEADI program.

CONCLUSIONS: With some modification, the fall risk screening algorithm based on the STEADI program was applicable in Thai context.

Language: en

Keywords

Community; Elderly; Fall risk screening algorithm; Predictive validity; STEADI

The addition of active stretching to balance strategy exercise is the most effective as a home-based exercise program in improving the balance of the elderly

Vittala G, Sundari LPR, Basuki N, Kuswardhani RAT, Purnawati S, Muliarta IM. J. Midlife Health 2021; 12(4): 294-298.

(Copyright © 2021, Medknow Publications)

DOI 10.4103/jmh.jmh_184_21 PMID 35264836

Abstract

BACKGROUND: The decreased balance in the elderly increases the risk of falling. An effective type of exercise is needed to improve balance for the elderly. **AIMS:** The purpose of this study was to determine the difference in the effectiveness of adding active stretching with dynamic stretching to balance strategy exercise as a home-based exercise program in improving the balance for the elderly. **PARTICIPANTS AND METHODS:** This research was a randomized control trial. The participants were 36 elderly selected based on the inclusion and exclusion criteria, divided into three groups. Group 1 was given dynamic stretching exercises to balance strategy exercises, Group 2 was assigned active stretching exercises to balance strategy exercise, and Group 3 was given balance strategy exercise only as a control group. Each group was given different exercises three times a week for 6 weeks. The balance ability of the elderly is measured using a Berg balance scale (BBS).

RESULTS: The mean difference scores of BBS before and after exercise with paired sample t-test increased in both groups with $P < 0.05$. It means that all groups had a significant impact, where the highest different score is in Group 2. The one-way ANOVA test showed a significant difference in the average posttest BBS value between the groups. Furthermore, the data were analyzed by the LSD post hoc test, where the results showed that all groups have significant differences against other groups ($P < 0.05$), with the best group being Group 2.

CONCLUSION: According to the results, the addition of active stretching exercise to the balance strategy exercise as a home-based exercise program is the most effective in improving balance for the elderly.

Language: en

Keywords

elderly; balance; Active stretching; balance strategy exercise; Berg balance scale; dynamic stretching

Impact of weather on pedestrians' slip risk

Hippi M, Kangas M. *Int. J. Environ. Res. Public Health* 2022; 19(5): e3007.

(Copyright © 2022, MDPI: Multidisciplinary Digital Publishing Institute)

DOI 10.3390/ijerph19053007 **PMID** 35270700

Abstract

Pedestrians' slipping injuries are a very typical problem in the Nordic countries, causing varying degrees of injuries and in the worst case, long sick leaves. There is a clear seasonal variation in the number of slips. Sidewalk slipperiness and the risk of slips is a complex combination of weather, winter maintenance activities, number of walkers, and the grip between shoes and surface, as well as human behavioral and physical factors. In this study, the effect of weather on pedestrians' slipping injuries is studied. Daily weather observations are compared to the slip statistics that have been collected from commuting accident statistics in cases where the way of commuting has been walking. A total of 16 cities from Finland for 14 winters are included in this study. The results reveal that snow on the ground increases the slip risk more than three times compared to no-snow situations. Near zero temperatures and precipitation are very typical on days when slip injuries occur more than usual. However, there are also days when high amounts of slips cannot be explained with the weather. The study also shows that there are significant differences as to the number and timing of slips between different parts of the country.

Language: en

Keywords

road safety; walking; commuting accident; pedestrians; slip; slipperiness; weather

Predictors of falls and fractures leading to hospitalisation in 36 101 people with affective disorders: a large representative cohort study

Ma R, Perera G, Romano E, Vancampfort D, Koyanagi A, Stewart R, Mueller C, Stubbs B. *BMJ Open* 2022; 12(3): e055070.

(Copyright © 2022, BMJ Publishing Group)

DOI 10.1136/bmjopen-2021-055070 **PMID** 35277405

Abstract

OBJECTIVES: To investigate predictors of falls and fractures leading to hospitalisation in people with affective disorders.

DESIGN: Cohort study. **SETTING:** The South London and Maudsley National Health Service (NHS) Foundation Trust (SLaM) Biomedical Research Centre (BRC) Case Register. **PARTICIPANTS:** A large cohort of people with affective disorders (International Classification of Diseases- 10th version [ICD-10] codes F30-F34) diagnosed between January 2008 and March 2016 was assembled using data from the SLaM BRC Case Register. **PRIMARY AND SECONDARY OUTCOME MEASURES:** Falls and fractures leading to hospitalisation were ascertained from linked national hospitalisation data. Multivariable Cox proportional hazards analyses were administered to identify predictors of first falls and fractures.

RESULTS: Of 36 101 people with affective disorders (mean age 44.4 years, 60.2% female), 816 (incidence rate 9.91 per 1000 person-years) and 1117 (incidence rate 11.92 per 1000 person-years) experienced either a fall or fracture, respectively. In multivariable analyses, older age, analgesic use, increased physical illness burden, previous hospital admission due to certain comorbid physical illnesses and increase in attendances to accident and emergency services following diagnosis were significant risk factors for both falls and fractures. Having a history of falls was a strong risk factor for recurrent falls, and a previous fracture was also associated with future fractures.

CONCLUSIONS: Over a mean 5 years' follow-up, approximately 8% of people with affective disorders were hospitalised with a fall or fracture. Several similar factors were found to predict risk of falls and fracture, for example, older age, comorbid physical disorders and analgesic use. Routine screening for bone mineral density and fall prevention programmes should be considered for this clinical group.

Language: en

Keywords

mental health; adult psychiatry; anxiety disorders; depression & mood disorders

Ten-second tandem stance test: a potential tool to assist walking aid prescription and falls risk in balance impaired individuals

Joo B, Marquez JL, Osmotherly PG. Arch. Rehabil. Res. Clin. Transl. 2022; 4(1): e100173.

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DOI 10.1016/j.arrct.2021.100173 PMID 35282143

Abstract

OBJECTIVE: To assess the utility of a 10-second tandem stance test in predicting gait impairment and the need for a mobility aid.

DESIGN: Cross-sectional study. **SETTING:** Public hospital ambulatory and hospitalized care. **PARTICIPANTS:** Participants were drawn from referrals to the physiotherapy service and patients identified by health care staff as needing mobility assessment. Eighty-seven people were referred to the study. Sixty-one individuals (N=61) consented to participate; mean age was 76±9.8 years and 61% were female. All participants were community dwelling. **INTERVENTION:** The 10-second tandem stance test and gait parameters were measured while walking with no walking aid, a walking stick, and a 4-wheeled walker were assessed. **MAIN OUTCOME MEASURES:** Associations between the 10-second tandem stance test performance with prescribed walking aids (primary outcome variable), gait parameters (gait cycle time, cadence, stance phase, swing phase, double support, stride length, speed, peak angle velocity, maximal heel clearance), falls history, falls risk (Falls Risk for Older People in the Community [FROP-Com]), and walking aid use.

RESULTS: Inability to maintain tandem stance for 10 seconds significantly increased the odds of requiring a prescribed walking aid (odds ratio [OR], 5.19; P=.01). Tandem stance test time was positively correlated with stride length, gait speed, peak angle velocity, and maximal heel clearance during the gait cycle. Correlation between tandem stance time and number of falls was weak but significant ($\rho=-0.31$, P=.01), and FROP-Com score for falls risk was negative and moderate for nonpreferred foot behind ($\rho=-0.58$, P<.01). The 10-second tandem stance with nonpreferred foot behind was associated with falling in previous 12 months (P=.04). Walking aid use history in subgroups with the individuals who cannot maintain the tandem stance with nonpreferred foot behind for 10 seconds was associated with falling in previous 12 months (OR, 55.00; 95% CI, 2.44-1238.46; P=.01).

CONCLUSIONS: The 10-second tandem stance test was associated with professionally prescribed walking aids, gait parameters with prescribed walking aids, falls, and walking aid use history, indicating the test may be useful to guide the prescription of walking aids.

Language: en

Keywords

Walking; Accidental falls; FROP-Com, Falls Risk for Older People in the Community; MMSE, Mini-Mental State Examination; OR, odds ratio; Physical therapy specialty; Prescriptions; Rehabilitation; Self-help devices

The relationships between sleep disturbance and falls: a systematic review

Knechel NA, Chang PS. *J. Sleep Res.* 2022; ePub(ePub): ePub.

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DOI 10.1111/jsr.13580 PMID 35288982

Abstract

The purpose of this systematic review was to examine critically the literature that addresses the association between sleep disturbance and falls. Electronic databases OVID MEDLINE, PubMed, and CINAHL were searched using MeSH terms "sleep" and "accidental falls." Search limits included adults, humans, and English. The articles selected for the final sample were assessed for methodological quality. Eleven key attributes of sleep disturbance were extracted. The search yielded 177 articles from OVID MEDLINE, 124 from PubMed, and 46 from CINAHL. The final sample included 42 papers. The mean methodological quality score was 7.5 (range 2-10). Those who self-report >11 h or ≤5 h of nocturnal sleep duration may have a greater fall risk, but variations in cutoff points, study designs, and data collection methods contribute to difficulty in comparing study results. Subjective sleep fragmentation is associated with falls. The few studies on obstructive sleep apnea and insomnia demonstrate evidence of an increased risk for falls. It remains unclear whether daytime sleepiness, self-reported sleep quality, snoring, or napping are associated with falls, since some but not all studies demonstrate an association and the study quality did not differ.

Language: en

Keywords

excessive daytime sleepiness; napping; nocturnal hypoxia; sleep onset