

Safety Literature 17th November 2019

A hybrid concept analysis of fall risk appraisal: integration of older adults' perspectives with an integrative literature review

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PMID

31773750

Abstract

AIM: This study aimed to define the concept of fall risk appraisal (FRA) and its measures by integrating the older adults' perspectives with an integrative literature review.

BACKGROUND: Appraised fall risk is based mainly on either subjective or objective measures, which may result in inaccurate predictions of fall risk.

DESIGN: This study was developed based on three phases of the hybrid concept analysis including a theoretical phase, a fieldwork phase, and an analytic phase. Eleven articles were selected to review in the theoretical phase. Qualitative data from in-depth interviews and focus groups in the fieldwork phase were used to compare and integrate into the analytic phase.

RESULTS: FRA is a two-dimensional assessment of fall risk in older adults. Two independent dimensions were defined as (a) physiological fall risk dimension reflecting physical or body function, which may decline with age, and (b) perceived fall risk dimension reflecting the older adults' perception of their likelihood to fall. FRA consists of two categories including adaptive fall risk appraisal and maladaptive fall risk appraisal.

CONCLUSION: A practical definition of FRA and its measures could be extremely valuable

Language: en

Keywords

fall risk appraisal; fall risk assessment; hybrid concept analysis; older adults

Development of a lifestyle-integrated physical exercise training and home modification intervention for older people living in a community with a risk of falling (Part 1): the FIT-at-Home fall prevention program

Müller C, Lautenschläger S, Dörge C, Voigt-Radloff S. *Disabil. Rehabil.* 2019; ePub(ePub): ePub.

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DOI 10.1080/09638288.2019.1661530 **PMID** 31760814

Abstract

Purpose: In this paper, we report on the development and refinement of a progressive physical exercise training and home modification intervention for older people with a risk of falling located in Germany by using the United Kingdom's Medical Research Council framework. **Methods:** The process was iterative and six phases of development emerged: (1) establishing an intervention development group, (2) identifying the evidence on interventions, (3) identifying a theory to underpin the intervention, (4) designing the intervention components, (5) drafting the intervention manual and training course, and (6) piloting and refining of intervention components. **Results:** The result was an evidence-based, theory-informed, and user-endorsed intervention: FIT-at-Home. This intervention comprised nine individual sessions over 12 weeks and two follow-up booster sessions delivered by trained occupational therapists. A feasibility study demonstrated the acceptance and feasibility of intervention delivery. Users responses were generally favorable and included recommendations about the intervention manual, mode of delivery of the home hazard assessment, and producing a manual for older people. **Conclusions:** We developed a feasible home-based lifestyle-integrated physical exercise training and home modification intervention for older people with a risk of falling by using a systematic approach. **Implications** include how this intervention could enrich occupational therapy fall prevention strategy in older people living at home. **IMPLICATIONS FOR REHABILITATION** Falls in older people represent a major public health concern and occupational therapists in rehabilitation practice are encouraged to apply evidence-based interventions that reduce the risk of falls in older people living in a community. Many physical and environmental fall risks are modifiable by lifestyle changes such as physical exercise training, home safety assessment, and home modification. We developed a home-based balance and strength exercise training and home modification intervention that aims to improve strength, balance, and home safety. This study indicates that older people, at risk of falling, with functional limitations, and limited mobility, who participated in the FIT-at-Home intervention, felt that exercising at home suited them best.

Keywords

Intervention development; exercises; falls prevention; home modification; home-based; older people

Does lower lean body mass mediate the relationship between falls and higher body mass index in Asian older persons?

Kioh SH, Mat S, Kamaruzzaman SB, Ibrahim F, Mokhtar MS, Hairi NN, Cumming RG, Myint PK, Tan MP. *J. Aging Phys. Act.* 2019; ePub(ePub): ePub.

(Copyright © 2019, Human Kinetics Publishers)

DOI

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PMID

31756717

Abstract

The current evidence on the relationship between a higher body mass index (BMI) and falls in older adults is conflicting. This study, therefore, evaluated the relationship between BMI and falls and explored underlying mechanisms for this relationship. Data from 1,340 individuals from the Malaysian Elders Longitudinal Research study, obtained through home-based computer-assisted interviews and followed by hospital-based health checks, were utilized. A history of the presence of falls in the previous 12 months was obtained. The presence of at least one fall in the past 12 months was associated with a higher BMI (odds ratio = 1.03, 95% confidence interval [1.01, 1.06]). The relationship between a higher BMI and falls was, however, attenuated by a lower percentage of lean body mass, which accounted for 69% of the total effect of BMI on the risk of falls. Future studies should now investigate this aforementioned relationship prospectively.

Language: en

Keywords

accidental falls; aged; muscle mass; obesity; sarcopenia

Effects of hydrokinesitherapy on balance and walking ability in stroke survivors: a systematic review and meta-analysis of randomized controlled studies

Xie G, Wang T, Jiang B, Su Y, Tang X, Guo Y, Liao J. *Eur. Rev. Aging Phys. Activ.* 2019; 16: e21.

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Abstract

BACKGROUND: Balance and walking impairment are common dysfunctions after stroke. Emerging data has demonstrated that hydrokinesitherapy may have a positive influence on improvement of balance and walking ability. However, there is no firm evidence to support these results. Therefore, the aim of this review is to evaluate the effects of hydrokinesitherapy in stroke survivors systematically.

METHODS: Medline, EMBASE, Cochrane Central Register of Controlled Trials (CENTRAL) in the Cochrane Library, CINAHL and SPORTDiscus were systemic searched from their inception to September 30, 2018. RevMan 5.3 software was used to perform data synthesis. The fixed-effect model or random-effect model was employed according to the results of heterogeneity test. The mean differences (MD) or standardized mean difference (SMD) was used to evaluate the pooled effect of hydrokinesitherapy on balance function, walking ability and activity of daily life (ADL).

RESULTS: A total of 13 studies were included involving 381 stroke survivors. Meta-analysis results indicated that hydrokinesitherapy could improve balance ability based on three test: Berg balance scale (BBS: MD = 3.84, 95% confidence interval (95% CI) 2.84 to 4.86, $P < 0.001$), Time Up To Go Test (TUGT: MD = - 1.22, 95% CI - 2.25 to - 0.18, $P = 0.02$, fixed-effect model), Functional Reach Test (FRT: MD = 2.41, 95% CI 1.49 to 3.33, $P < 0.001$). Additionally, we found a weakly positive effect on walking speed (SMD = 0.75, 95% CI 0.26 to 1.25, $P = 0.003$) and walking ability test (SMD = 0.36, 95% CI 0.04 to 0.68, $P = 0.03$). There was no significant difference between experimental group and control group in terms of ADL. **SHORT CONCLUSION:** Hydrokinesitherapy can improve balance function and had a weakly positive effect on walking ability in stroke survivors. We did not find sufficient evidence to indicate that hydrokinesitherapy could improve the ADL of stroke survivors. However, due to the methodological shortcoming and small number of included studies, caution is needed when interpreting these results. Due to imprecision and publication bias, the quality of the evidence was downgraded to "low-quality" for the primary outcomes of balance and walking ability. **TRIAL REGISTRATION:** CRD42018110787.

Language: en

Keywords Balance; Hydrokinesitherapy; Meta-analysis; Stroke; Walking ability

Falling again? Falls in geriatric adults-risk factors and outcomes associated with recidivism

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Abstract

BACKGROUND: The elderly population is at increased risk of fall-related readmissions (FRRs). This study is aimed to identify the factors predictive of repeat falls and to analyze the associated outcomes.

METHODS: We studied the Nationwide Readmission Database for the year 2010 and identified the patients (≥ 65 years) who were admitted after falls, and from that subset, further analyzed patients with ≥ 1 FRRs. Descriptive statistics were used to analyze continuous and categorical variables. Multivariable logistic regression was used to identify predictors of readmission in geriatric patients after controlling for covariates.

RESULTS: A total of 358,581 initial fall-related admissions in geriatric adults were identified, and of these, 21,713 experienced ≥ 1 FRRs (6.06% risk of repeat fall-related admission). Females outnumbered males, and female gender was identified as an independent predictor of FRR (OR 1.10 95% CI 1.07-1.14 $P = 0.000$). The other independent predictors significantly associated with FRR were age (OR 1.007, 95% CI 1.005-1.009), depression (OR 1.25, 95% CI 1.21-1.30), drug abuse (OR 1.37, 95% CI 1.15-1.63), liver disease (OR 1.25, 95% CI 1.15-1.43, $P < 0.001$), psychosis (OR 1.16, 95% CI 1.09-1.23), valvular heart disease (OR 1.07, 95% CI 1.02-1.12), chronic pulmonary disease (OR 1.10, 95% CI 1.06-1.13), and number of chronic conditions (OR 1.022, 95% CI 1.016-1.29). Patients admitted emergently or urgently had higher odds of FRR (OR 1.44, 95% CI 1.36-1.52). Hospital demographic was a significant predictor of FRR, as hospitals with bed number > 500 was associated with lower odds (OR 0.95, 95% CI 0.92-0.98, $P < 0.001$). Geriatric patients admitted at nonteaching hospitals and hospitals in large metro areas (population > 1 million) had higher odds of FRR (OR 1.10, 95% CI 1.03 - 1.16) and (OR 1.10, 95% CI 1.07-1.14), respectively. With respect to discharge disposition, patients in the FRR group were less likely to go home (5.9% versus 21.0%) or with home health care (12.6% versus 18.5%), but more likely to be discharged to skilled nursing or intermediate-care facilities (64.1% versus 54.9%) and short-term hospitals (2.8% versus 1.4%). The mortality rate was higher in the FRR group but was not statistically significant (OR 1.06, 95% CI 0.99-1.14).

CONCLUSIONS: Given the high burden of fall-related injuries and FRRs to patients and the health care system, it is essential to identify those who are at risk. This study provides a comprehensive list of high-risk predictors as well as the impact on patient outcomes, and hence a chance to intervene for patients with FRRs.

Language: en

Keywords

Elderly; Fall-related readmissions; Geriatric patients; Predictors; Prevention; Repeat falls

Insomnia, benzodiazepine use, and falls among residents in long-term care facilities

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31766368

Abstract

Background: Falls are leading cause of injury among older people, especially for those living in long-term care facilities (LTCFs). Very few studies have assessed the effect of sleep quality and hypnotics use on falls, especially in Chinese LTCFs. The study aimed to examine the association between sleep quality, hypnotics use, and falls in institutionalized older people. **Methods:** We recruited 605 residents from 25 LTCFs in central Shanghai and conducted a baseline survey for sleep quality and hypnotics use, as well as a one-year follow-up survey for falls and injurious falls. Logistic regression models were applied in univariate and multivariate analysis. **Results:** Among the 605 participants (70.41% women, mean age 84.33 ± 6.90 years), the one-year incidence of falls and injurious falls was 21.82% and 15.21%, respectively. Insomnia (19.83%) and hypnotics use (14.21%) were prevalent. After adjusting for potential confounders, we found that insomnia was significantly associated with an increased risk of falls (adjusted risk ratio (RR): 1.787, 95% CI, 1.106-2.877) and the use of benzodiazepines significantly increased the risk of injurious falls (RR: 3.128, 95% CI, 1.541-6.350). **Conclusion:** In elderly LTCF residents, both insomnia and benzodiazepine use are associated with an increased risk of falls and injuries. Adopting non-pharmacological approaches to improve sleep quality, taking safer hypnotics, or strengthening supervision on benzodiazepine users may be useful in fall prevention.

Language: en

Keywords

benzodiazepines; falls; insomnia; long-term care; sleep quality

Measures of dynamic balance during level walking in healthy adult subjects: relationship with age, anthropometry and spatio-temporal gait parameters

Lencioni T, Carpinella I, Rabuffetti M, Cattaneo D, Ferrarin M. Proc. Inst. Mech. Eng. Pt. H J. Eng. Med. 2019; ePub(ePub): ePub.

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Abstract

The maintenance of balance in dynamic conditions (e.g. during walking) is a necessary requirement that motor control must reach to avoid falls. However, this is a challenging situation, since to ensure the forward progression of the body, the center of mass must stay outside the base of support in the sagittal plane, and simultaneously remain inside the lateral borders in the frontal plane. Deviation from normative data of healthy subjects in dynamic balance could be used to quantify gait stability, fall risk and to provide hints for rehabilitation. However, normative data can be influenced by age, sex, anthropometry and spatio-temporal gait parameters, and such differences among subjects and leg side can hamper accurate assessment. The aims of this study were to investigate, in a group of healthy subjects: (1) possible asymmetry in dynamic balance maintenance strategies between leg sides, (2) the influence of age, sex and anthropometry on stability and (3) its dependence by spatio-temporal gait parameters. A total of 34 healthy subjects aged between 21 and 71 years, and ranging from 50.1 to 101.6 kg of body mass and from 155.0 to 188.9 cm of height were assessed on spatio-temporal and dynamic balance parameters (Foot Placement Estimator at heel strike and Margin of Stability at mid-stance) during self-selected gait. No parameter showed differences between legs. Dynamic balance parameters were influenced by sex, age, body mass and height mainly in the frontal plane. These measures were also correlated with gait speed and stride length both in the antero-posterior and medio-lateral directions. In addition also cadence and step width influenced the stability in the sagittal and frontal planes, respectively. The findings of this study confirm the symmetry in motor control of dynamic balance during self-selected gait in healthy subjects. Sex, anthropometry and spatio-temporal gait parameters have a significant effect on stability parameters, and this should be taken into account in dynamic balance studies.

Language: en

Keywords

Gait analysis; center of mass; dynamic balance; foot placement estimator; margin of stability

Medications acting on the central nervous system and fall-related injuries in community dwelling older adults: a new user cohort study

Gray SL, Marcum ZA, Dublin S, Walker R, Golchin N, Rosenberg DE, Bowles EJ, Crane P, Larson EB. *J. Gerontol. A Biol. Sci. Med. Sci.* 2019; ePub(ePub): ePub.

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Abstract

BACKGROUND: It is well established that individual medications that affect the central nervous system (CNS) increase falls risk in older adults. However, less is known about risks associated with taking multiple CNS-active medications.

METHODS: Employing a new user design, we used data from the Adult Changes in Thought study, a prospective cohort of community-dwelling people aged 65 and older without dementia. We created a time-varying composite measure of CNS-active medication exposure from electronic pharmacy fill data and categorized into mutually exclusive categories: current (within prior 30 days), recent (31-90 days), past (91-365 days), or non-use (no exposure in prior year). We calculated standardized daily dose and identified new initiation. Cox proportional hazards models examined the associations between exposures and the outcome of fall-related injury identified from health plan electronic databases.

RESULTS: 2,595 people had 624 fall-related injuries over 15,531 person-years of follow-up.

KEYWORDS (not in title): Relative to non-use, fall-related injury risk was significantly greater for current use of CNS-active medication (HR 1.95; 95% CI 1.57-2.42), but not for recent or past use. Among current users, increased risk was noted with all doses. Risk was increased for new initiation compared with no current use (HR 2.81; 95% CI 2.09-3.78). Post-hoc analyses revealed that risk was especially elevated with new initiation of opioids.

CONCLUSION: We found that current use, especially new initiation, of CNS-active medications was associated with fall-related injury in community-dwelling older adults. Increased risk was noted with all dose categories. Risk was particularly increased with new initiation of opioids.

Language: en

Keywords

drug related; epidemiology; falls



Seasonal pattern of single falls and recurrent falls amongst community-dwelling older adults first applying for long-term care services in Hong Kong

Qian XX, Chau PH, Kwan CW, Lou VW, Leung AYM, Ho M, Fong DYT, Chi I. Age Ageing 2019; ePub(ePub): ePub.

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(Copyright © 2019, Oxford University Press)

DOI

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PMID

31763678

Abstract

BACKGROUND: few studies had investigated seasonal pattern of recurrent falls.

OBJECTIVE: to examine seasonal pattern of both single and recurrent falls amongst community-dwelling older adults first applying for long-term care (LTC) services.

METHODS: a cohort of 89,100 community-dwelling Hong Kong older adults aged 65 and over first applying for LTC services from 2005 to 2014 was obtained. Logistic regression models were used to examine seasonal pattern in single and recurrent falls, whilst controlling for gender, age and year.

RESULTS: amongst 89,100 older adults, about 32% fell in past 90 days. Amongst the fallers, 34% fell recurrently. In 2014, the incidences of all fall, single fall and recurrent fall were 1.95, 0.80 and 1.15 per person-years, respectively. For single falls, the 90-day fall risk was highest during November to February with an odds ratio (OR) of 1.29 (95% confidence interval [CI] 1.19-1.41), compared with the lowest one during July to October. For recurrent falls, the highest OR for 90-day risk was highest during November to February (1.46, 95% CI 1.31-1.64) as well.

CONCLUSIONS: single and recurrent falls both peaked during winter months. Interventions, such as implementing educational publicity and sending reminder to older adults in fall season, may be considered.

Language: en

Keywords

older people; recurrent fall; seasonal patterns; single fall

The importance and role of proprioception in the elderly: a short review

Ferlinc A, Fabiani E, Velnar T, Gradisnik L. Mater. Sociomed. 2019; 31(3): 219-221.

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PMID

31762707

Abstract

INTRODUCTION: Aging causes alterations in various body functions, such as motor, sensory, cognitive and psychosocial. One of the factors associated with aging is also the decline in proprioceptive function.

AIM: This paper provides an overview from the literature about the definition and importance of proprioception and the correlation with the elderly population. **MATERIAL AND METHODS:** The scientific literature was reviewed through PubMed, Medline and Science Direct. The articles were chosen in correlation with the study objective and their scientific relevance.

RESULTS: Proprioceptive training is fundamental in the rehabilitation and prevention of sports injuries. With the loss of proprioception during aging, the biomechanics of joints and the neuromuscular control of the limbs may change, resulting in impaired balance and a higher possibility of falls. Appropriate and proper physical activity can slow the age-related decline in proprioception.

CONCLUSION: An appropriate proprioceptive training is important for maintaining the best possible physical fitness. It encompasses exercises for stability and coordination, stimulates motor learning, helps in maintaining proper body posture and balance, and improves body control.

Language: en

Keywords

falls; movement; proprioception; rehabilitation; the elderly

Use of falls risk increasing drugs in residents at high and low falls risk in aged care services

Wang KN, Bell JS, Gilmartin-Thomas JFM, Tan ECK, Cooper T, Robson L, Ilomäki J. J. Appl. Gerontol. 2019; ePub(ePub): ePub.

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DOI

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31771405

Abstract

Falls are associated with considerable morbidity and mortality in aged care services and falls risk increasing drugs (FRIDs) are often overlooked as a contributor to falls. This study aims to investigate the association between the risk of falling and use of FRIDs from aged care services. Inverse-probability-weighted multinomial logistic regression was used to estimate the association between falls risk and regular FRIDs in 383 residents from six Australian aged care services. Overall, residents at high and low falls risk had similar prevalence of FRIDs. Prevalence of antipsychotics and sedative-hypnotics was low. Residents at high falls risk had higher adjusted odds of using ≥ 2 psychotropic medications (odds ratio [OR] = 1.75, 95% confidence interval [CI] = 1.17-2.61) and ≥ 2 medications that cause/worsen orthostatic hypotension (OR = 3.59, 95% CI = 2.27-5.69). High prevalence of FRIDs was mainly attributable to medications for which residents had clinical indications. Clinicians appeared to have largely avoided FRIDs that explicit criteria deem potentially inappropriate for high falls risk.

Language: en

Keywords

falls; medication; nursing homes

Wearable inertial sensors to measure gait and posture characteristic differences in older adult fallers and non-fallers: a scoping review

Patel M, Pavic A, Goodwin VA. *Gait Posture* 2019; 76: 110-121.

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DOI

10.1016/j.gaitpost.2019.10.039

PMID

31756666

Abstract

BACKGROUND: Wearable inertial sensors have grown in popularity as a means of objectively assessing fall risk. This review aimed to identify gait and posture differences among older adult fallers and non-fallers which can be measured with the use of wearable inertial sensors. In addition to describing the number of sensors used to obtain measures, the concurrent anatomical locations, how these measures compare to current forms of clinical fall risk assessment tests and the setting of tests.

METHODS: Following the development of a rigorous search strategy, MEDLINE, Web of Science, Cochrane, EMBASE, PEDro, and CINAHL were systematically searched for studies involving the use of wearable inertial sensors, to determine gait and postural based differences among fallers or those at high fall risk compared with non-fallers and low fall risk adults aged 60 years and older.

RESULTS: Thirty five papers met the inclusion criteria. One hundred and forty nine gait and posture characteristic differences were identified using wearable inertial sensors. There were sensor derived measures which significantly and strongly correlated with traditional clinical tests. The use of a single wearable inertial sensor located at the lower posterior trunk, was most the most effective location and enough to ascertain multiple pertinent fall risk factors.

CONCLUSION: This review identified the capabilities of identifying fall risk factors among older adults with the use of wearable inertial sensors. The lightweight portable nature makes inertial sensors an effective tool to be implemented into clinical fall risk assessment and continuous unsupervised home monitoring, in addition to, outdoor testing.

Language: en

Keywords

Fall risk; Gait; Older adults; Posture; Wearable inertial sensor

Evaluating a fall risk assessment tool in an emergency department

Luo S, Kalman M, Haines P. J. *Healthc. Qual.* 2019; ePub(ePub): ePub.

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DOI

10.1097/JHQ.0000000000000233

PMID

31764249

Abstract

INTRODUCTION: A hospital's emergency department (ED) used the Johns Hopkins fall risk assessment tool (JHFRAT), which was not developed to assess the ED patients. The ED committee recommended the memorial ED fall risk assessment tool (MEDFRAT) plus a "nursing judgment" category. However, the modified MEDFRAT needed to be evaluated before implementation. This research evaluated the modified MEDFRAT in ED patients and nurses' perception of the tool.

METHODS: A two-stage quantitative design was used. Stage 1 was a chart review using both tools for patients who fell ($n = 57$) in the past 4 years and the control patients ($n = 57$). Two tools were compared using t-tests, Bland-Altman, predictive abilities, and mismatch rates. Stage 2 was the assessment of all ED patients ($n = 435$) seen by the ED triage nurses for 1 week using both tools. The chi-squared test and mismatch rates were used to compare the tools. Time to complete both tools and nurses' perceptions to the modified MEDFRAT were analyzed.

RESULTS: Two tools were significantly different. The modified MEDFRAT had higher predictive ability and lower mismatch rates than the JHFRAT. It needed shorter time to complete and was preferred by most nurses.

CONCLUSIONS: The modified MEDFRAT is adequate to use in the ED.

Language: en

Fall determinants in the adult Portuguese: do chronic conditions change the risk of falling?

Marques AJ, Rodrigues A, Dias S, Canhão H, Branco J, Vaz C. Acta Reumatol. Port. 2019; ePub(ePub): ePub.

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DOI unavailable PMID 31754087

Abstract

OBJECTIVES: Falls are a major public health issue, given its prevalence and social impact. This study aimed to (1) characterize fallers in the adult Portuguese population as well as (2) identify if some chronic conditions are fall determinants. **MATERIAL AND METHODS:** Our data of 7403 adults (≥ 18 years) was retrieved from phase 1 survey of EpiReumaPt, a representative sample of adult Portuguese population. We analyzed sociodemographic variables and the presence of chronic diseases, which was evaluated by self-report. Anxiety/depression symptoms were assessed using The Hospital Anxiety and Depression Scale (HADS). Fall was defined by the presence of a self-report fall in the previous 12 months to the interview. Univariate and Multivariable logistic regression were used to assess fall determinants. Analyses were conducted in Stata v13.

RESULTS: The estimated prevalence of falls in the Portuguese population is 24,1%. Women are at 2.12 times higher risk of fall than man (95% CI 1.79 - 2.51) and there's also a progressive increasing association between age and falls, with people with 75+ years having greater odds of falling (OR = 1.86 95% CI 1.49 - 2.31). Different chronic health conditions were identified as major determinants of falls in the Portuguese population. Neurologic (OR = 1.64 95% CI 1.17 - 2.32) and rheumatic (OR = 1.44 95% CI 1.18 - 1.74) disease were significantly and independently associated with falls. Similar results were found for presence of anxiety (OR = 1.33 95% CI 1.04 - 1.71) or depression (OR = 1.61 95% CI 1.20 - 2.15) symptoms.

CONCLUSIONS: Our results show a perspective of the determinants of falls in the Portuguese population, allowing us to know that women and elders are at greater risk. We have showed that some chronic diseases are associated with falls, in particular musculoskeletal diseases and mental diseases. Implementing specific and adapted prevention strategies might reduce the number and complications of falls ultimately improving Portuguese overall health.

Language: en

Older adults demonstrate interlimb transfer of reactive gait adaptations to repeated unpredictable gait perturbations

McCrum C, Karamanidis K, Grevendonk L, Zijlstra W, Meijer K. *Geroscience* 2019; ePub(ePub): ePub.

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Abstract

The ability to rapidly adjust gait to cope with unexpected mechanical perturbations declines with ageing. Previous studies, however, have not ensured that gait stability pre-perturbation was equivalent across participants or age groups which may have influenced the outcomes. In this study, we investigate if age-related differences in stability following gait perturbations remain when all participants walk with equivalent stability. We also examine if interlimb transfer of gait adaptations are observed in healthy older adults, by examining if adaptation to repeated perturbations of one leg can benefit stability recovery when the other leg is perturbed. During walking at their stability-normalised walking speeds (young: 1.32 ± 0.07 m/s; older: 1.31 ± 0.13 m/s; normalised to an average margin of stability of 0.05 m), 30 young and 28 older healthy adults experienced ten unpredictable treadmill belt accelerations (the first and last applied to the right leg, the others to the left leg). Using kinematic data, we assessed the margins of stability during unperturbed walking and the first eight post-perturbation recovery steps. Older adults required three more steps to recover during the first perturbation to each leg than the young adults. Yet, after repeated perturbations of the left leg, older adults required only one more step to recover. Interestingly, for the untrained right leg, the older adults could regain stability with three fewer steps, indicating interlimb transfer of the improvements. Age differences in reactive gait stability remain even when participants' walk with equivalent stability. Furthermore, we show that healthy older adults can transfer improvements in balance recovery made during repeated perturbations to one limb to their recovery following a perturbation to the untrained limb.

Language: en

Keywords

Aged; Balance; Falls; Locomotion; Stability