

## SafetyLit March 19, 2017

### Biopsychosocial predictors of fall events among older African Americans

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#### Abstract

This study identifies risk and protective factors for falls among older, community-dwelling African Americans. Drawing upon the biopsychosocial perspective, we conducted a series of sex- and age-adjusted multinomial logistic regression analyses to identify the correlates of fall events among older African Americans. Our sample consisted of 1,442 community-dwelling African Americans aged 65 and older, participating in the 2010-2012 rounds of the Health and Retirement Study. Biophysical characteristics associated with greater relative risk of experiencing single and/or multiple falls included greater functional limitations, poorer self-rated health, poorer self-rated vision, chronic illnesses (high blood pressure, diabetes, cancer, lung disease, heart problems, stroke, and arthritis), greater chronic illness comorbidity, older age, and female sex. Physical activity was negatively associated with recurrent falls. Among the examined psychosocial characteristics, greater depressive symptoms were associated with greater relative risk of experiencing single and multiple fall events. Implications for clinicians and future studies are discussed.

#### PDF Y EndnoteY

### Comparing two frailty concepts among older people with intellectual disabilities

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*Eur. J. Ageing* 2017; 14(1): 63-79.

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#### Abstract

In general, disabilities are considered a consequence of frailty rather than a cause of frailty, whereas in people with intellectual disabilities (ID), disabilities are often lifelong, which could have consequences for the feasibility and validity of frailty instruments. To better understand frailty in people with ID, we compared two broadly used concepts: the frailty phenotype (FP) and the frailty index (FI) taking into account their feasibility (e.g., percentage of participants able to complete the frailty assessments), agreement, validity (based on 5-year mortality risk), influence of motor disability, and the relation between single frailty variables and mortality. The FI and an adapted version of the FP were applied to a representative dataset of 1050 people with ID, aged 50 years and over. The FI was feasible in a larger part of the dataset (94 %) than the adapted FP: 29 % for all five items, and 81 % for at least three items. There was a slight agreement between the approaches ( $\kappa = 0.3$ ). However defined, frailty was related with mortality, but the FI showed higher discriminative ability and a stronger relation with mortality, especially when adjusted for motor disabilities. Concluding, these results imply that the used FI is a stronger predictor for mortality and has higher feasibility than our adaptation of the FP, in older people with ID. Possible explanations of

our findings are that we did not use the exact FP variables or that the FI includes multiple health domains, and the variables of the FI have lower sensitivity to lifelong disabilities and are less determined by mobility.

#### PDF Y Endnote Y

### Comparison of the Berg Balance Scale and Fullerton Advanced Balance Scale to predict falls in community-dwelling adults

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*J. Phys. Ther. Sci.* 2017; 29(2): 232-234.

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(Copyright © 2017, Society of Physical Therapy Science)

**DOI** 10.1589/jpts.29.232 **PMID** 28265146 **PMCID** PMC5332977

#### Abstract

**PURPOSE:** The purpose of this study was to investigate and compare the predictive properties of Berg Balance Scale and Fullerton Advanced Balance Scales, in a group of independently-functioning community dwelling older adults.

**SUBJECTS AND METHODS:** Ninety-seven community-dwelling older adults (male=39, female=58) who were capable of walking independently on assessment were included in this study. A binary logistic regression analysis of the Berg Balance Scale and Fullerton Advanced Balance Scale scores was used to investigate a predictive model for fall risk. A receiver operating characteristic analysis was conducted for each, to determine the cut-off for optimal levels of sensitivity and specificity.

**RESULTS:** The overall prediction success rate was 89.7%; the total Berg Balance Scale and Fullerton Advanced Balance Scale scores were significant in predicting fall risk. Receiver operating characteristic analysis determined that a cut-off score of 40 out of 56 on the Berg Balance Scale produced the highest sensitivity (0.82) and specificity (0.67), and a cut-off score of 22 out of 40 on the Fullerton Advanced Balance Scale produced the highest sensitivity (0.85) and specificity (0.65) in predicting faller status.

**CONCLUSION:** The Berg Balance Scale and Fullerton Advanced Balance Scales can predict fall risk, when used for independently-functioning community-dwelling older adults.

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### Depressive symptomatology and fall risk among community-dwelling older adults

Hoffman GJ, Hays RD, Wallace SP, Shapiro MF, Ettner SL.

*Soc. Sci. Med.* 2017; ePub(ePub): ePub.

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**DOI** 10.1016/j.socscimed.2017.02.020 **PMID** 8279573

#### Abstract

**RATIONALE:** Falls are common among older adults and may be related to depressive symptoms (DS). With advancing age, there is an onset of chronic conditions, sensory impairments, and activity limitations that are associated with falls and with depressive disorders. Prior cross-sectional studies have observed significant associations between DS and subsequent falls as well as between fractures and subsequent clinical depression and DS.

**OBJECTIVE:** The directionality of these observed relationships between falls and DS is in need of elaboration given that cross-sectional study designs can yield biased estimates of the DS-falls relationship.

**METHODS:** Using 2006-2010 Health and Retirement Study data, cross-lagged panel structural equation models were used to evaluate associations between falls and DS among 7233 community-dwelling adults ages  $\geq 65$ . Structural coefficients between falls and DS (in 2006 $\rightarrow$ 2008, 2008 $\rightarrow$ 2010) were estimated.

**RESULTS:** A good-fitting model was found: Controlling for baseline (2006) physical functioning, vision, chronic conditions, and social support and neighborhood social cohesion, falls were not associated with subsequent DS, but a 0.5 standard deviation increase in 2006 DS was associated with a 30% increase in fall risk two years later. This DS-falls relationship was no longer significant when use of psychiatric medications, which was positively associated with falls, was included in the model.

**CONCLUSION:** Using sophisticated methods and a large U.S. sample, we found larger magnitudes of effect in the DS-falls relationship than in prior studies-highlighting the risk of falls for older adults with DS. Medical providers might assess older individuals for DS as well as use of psychotropic medications as part of a broadened falls prevention approach. National guidelines for fall risk assessments as well as quality indicators for fall prevention should include assessment for clinical depression.

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#### **PDF Y Endnote Y**

#### **Differences between gait on stairs and flat surfaces in relation to fall risk and future falls**

Wang K, Delbaere K, Brodie M, Lovell N, Kark L, Lord S, Redmond S.

*IEEE J. Biomed. Health Inform.* 2017; ePub(ePub): ePub.

(Copyright © 2017, Institute of Electrical and Electronics Engineers)

**DOI** 10.1109/JBHI.2017.2677901 **PMID** 28278486

#### **Abstract**

We used body-worn inertial sensors to quantify differences in semi-free-living gait between stairs and on normal flat ground in older adults, and investigated the utility of assessing gait on these terrains for predicting the occurrence of multiple falls. 82 community-dwelling older adults wore two inertial sensors, on the lower back and the right ankle, during several bouts of walking on flat surfaces and up and down stairs, in between rests and activities of daily living. Derived from the vertical acceleration at the lower back, step rate was calculated from the signal's fundamental frequency. Step rate variability was the width of this fundamental frequency peak from the signal's power spectral density. Movement vigor was calculated at both body locations from the signal variance. Partial Spearman correlations between gait parameters and physiological fall risk factors (components from the Physiological Profile Assessment) were calculated while controlling for age and gender. Overall, anteroposterior vigor at the lower back in stair descent was lower in subjects with longer reaction times. Older adults walked more slowly on stairs, but they were not significantly slower on flat surfaces. Using logistic regression, faster step rate in stair descent was associated with multiple prospective falls over 12 months. No significant associations were shown from gait parameters derived during walking upstairs or on flat surfaces.

These results suggest that stair descent gait may provide more insight into fall risk than regular walking and stair ascent, and that further sensor-based investigation into unsupervised gait on different terrains would be valuable.

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#### **Efficacy of a student-led, community-based, multifactorial fall prevention program: stay in balance**

Der Ananian CA, Mitros M, Buman MP.

*Front. Public Health* 2017; 5: 30.

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**DOI** 10.3389/fpubh.2017.00030 **PMID** 28289679 **PMCID** PMC5326768

#### **Abstract**

**BACKGROUND:** Falls are a major public health concern in older adults. Recent fall prevention guidelines recommend the use of multifactorial fall prevention programs (FPPs) that include exercise for community-dwelling older adults; however, the availability of sustainable, community-based FPPs is limited.

**METHODS:** We conducted a 24-week quasi-experimental study to evaluate the efficacy of a community-based, multifactorial FPP [Stay in Balance (SIB)] on dynamic and functional balance and muscular strength. The SIB program was delivered by allied health students and included a health education program focused on fall risk factors and a progressive exercise program emphasizing lower-extremity strength and balance. All participants initially received the 12-week SIB program, and participants were non-randomly assigned at baseline to either continue the SIB exercise program at home or as a center-based program for an additional 12 weeks. Adults aged 60 and older ( $n = 69$ ) who were at-risk of falling (fall history or 2+ fall risk factors) were recruited to participate. Mixed effects repeated measures using Statistical Application Software Proc Mixed were used to examine group, time, and group-by-time effects on dynamic balance (8-Foot Up and Go), functional balance (Berg Balance Scale), and muscular strength (30 s chair stands and 30 s arm curls). Non-normally distributed outcome variables were log-transformed.

**RESULTS:** After adjusting for age, gender, and body mass index, 8-Foot Up and Go scores, improved significantly over time [ $F(2,173) = 8.92$ ,  $p = 0.0$ ;  $T0 - T2$  diff = 1.2 (1.0)]. Berg Balance Scores [ $F(2,173) = 29.0$ ,  $p < 0.0001$ ;  $T0 - T2$  diff = 4.96 (0.72)], chair stands [ $F(2,171) = 10.17$ ,  $p < 0.0001$ ;  $T0 - T2$  diff = 3.1 (0.7)], and arm curls [ $F(2,171) = 12.7$ ,  $p < 0.02$ ;  $T0 - T2$  diff = 2.7 (0.6)] also all improved significantly over time. There were no significant group-by-time effects observed for any of the outcomes.

**CONCLUSION:** The SIB program improved dynamic and functional balance and muscular strength in older adults at-risk for falling. Our findings indicate continuing home-based strength and balance exercises at home after completion of a center-based FPP program may be an effective and feasible way to maintain improvements in balance and strength parameters.

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#### **Exercise and nutritional approaches to prevent frail bones, falls and fractures: an update**

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*Climacteric* 2017; 20(2): 119-124.

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### Abstract

Osteoporosis (low bone strength) and sarcopenia (low muscle mass, strength and/or impaired function) often co-exist (hence the term 'sarco-osteoporosis') and have similar health consequences with regard to disability, falls, frailty and fractures. Exercise and adequate nutrition, particularly with regard to vitamin D, calcium and protein, are key lifestyle approaches that can simultaneously optimize bone, muscle and functional outcomes in older people, if they are individually tailored and appropriately prescribed in terms of the type and dose. Not all forms of exercise are equally effective for optimizing musculoskeletal health. Regular walking alone has little or no effect on bone or muscle. Traditional progressive resistance training (PRT) is effective for improving muscle mass, size and strength, but it has mixed effects on muscle function and falls which may be due to the common prescription of slow and controlled movement patterns. At present, targeted multi-modal programs incorporating traditional and high-velocity PRT, weight-bearing impact exercises and challenging balance/mobility activities appear to be most effective for optimizing musculoskeletal health and function. Reducing and breaking up sitting time may also help attenuate muscle loss. There is also evidence to support an interaction between exercise and various nutritional factors, particularly protein and some multi-nutrient supplements, on muscle and bone health in the elderly. This review summary provides an overview of the latest evidence with regard to the optimal type and dose of exercise and the role of various nutritional factors for preventing bone and muscle loss and improving functional capacity in older people.

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#### **Hospital admissions by the oldest old: past trends in one of the most ageing countries in the world**

Brandão D, Ribeiro O, Freitas A, Paúl C.

*Geriatr. Gerontol. Int.* 2017; ePub(ePub): ePub.

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### Abstract

**AIM:** To examine discharges of octogenarians, nonagenarians and centenarians from Portuguese public hospitals, namely admission type, principal diagnoses, comorbidities and length of stay.

**METHODS:** The present study used administrative data from public acute care hospitals in the Portuguese National Health Service. All discharges of persons aged  $\geq 80$  years between 2000 and 2014 were analyzed. HCUP Clinical Classifications Software was considered to aggregate principal diagnosis, and comorbidities were assessed using the Charlson Comorbidity Index computed using International Classification of Diseases 9th Revision Clinical Modification codes.

**RESULTS:** A total of 2 494 924 discharges of persons aged 80 years or older were registered. Most (73.7%) referred to inpatient episodes, of which 73% were unplanned and medical (non-surgical). Pneumonia (12.2%), acute cerebrovascular disease (7.1%) and non-hypertensive cardiac heart failure (5.3%) were the most common principal diagnoses among inpatient episodes. Congestive heart failure and diabetes without chronic complications were the two most frequent comorbidities (16.6%), and discharge diagnoses with higher median length of stay were tuberculosis, burns, and infective arthritis and osteomyelitis.

**CONCLUSIONS:** The number of hospitalizations of the oldest old has suffered a significant increase in

the past few years, reinforcing the need for healthcare services being prepared to the specificities of the oldest old population. © 2017 Japan Geriatrics Society.

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#### **Impaired orthostatic blood pressure recovery is associated with unexplained and injurious falls**

Finucane C, O'Connell MD, Donoghue O, Richardson K, Savva GM, Kenny RA.

*J. Am. Geriatr. Soc.* 2017; ePub(ePub): ePub.

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#### **Abstract**

**OBJECTIVES:** Cardiovascular disorders are recognized as important modifiable risk factors for falls. However, the association between falls and orthostatic hypotension (OH) remains ambivalent, particularly because of poor measurement methods of previous studies. The goal was to determine for the first time to what extent OH (and variants) are risk factors for incident falls, unexplained falls (UF), injurious falls (IF) and syncope using dynamic blood pressure (BP) measurements in a population study.

**DESIGN:** Nationally representative longitudinal cohort study-The Irish Longitudinal Study on Ageing (TILDA)-wave 1 (2009-2011) with 2-year follow-up at wave 2 (2012-2013).

**SETTING:** Community-dwelling adults.

**PARTICIPANTS:** Four thousand one hundred twenty-seven participants were randomly sampled from the population of older adults aged  $\geq 50$  years resident in Ireland.

**MEASUREMENTS:** Continuous BP recordings measured during active stands were analyzed. OH and variants (initial OH and impaired orthostatic BP stabilization OH(40)) were defined using dynamic BP measurements. Associations with the number of falls, UF, IF, and syncope reported 2 years later were assessed using negative binomial and modified Poisson regression as appropriate.

**RESULTS:** Participants had a mean age of 61.5 (8.2) years (54.2% female). OH(40) was associated with increased relative risk of UF (RR: 1.52 95% CI: 1.03-2.26). OH was associated with all-cause falls (IRR: 1.40 95% CI: 1.01-1.96), UF(RR: 1.81 95% CI: 1.06-3.09), and IF(RR: 1.58 95% CI: 1.12-2.24). IOH was not associated with any outcome.

**CONCLUSION:** With the exception of initial orthostatic hypotension, beat-to-beat measures of impaired orthostatic BP recovery (delayed recovery OH (40) or sustained orthostatic hypotension OH) are independent risk factors for future falls, unexplained falls, and injurious falls.

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#### **Interaction between the oculomotor and postural systems during a dual-task: compensatory reductions in head sway following visually-induced postural perturbations promote the production of accurate double-step saccades in standing human adults**

Boulanger M, Giraudet G, Faubert J.

*PLoS One* 2017; 12(3): e0173678.

**Affiliation:** École d'Optométrie, Université de Montréal, Montreal, Quebec, Canada.

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**DOI** 10.1371/journal.pone.0173678 **PMID** 28296958

#### **Abstract**

Humans routinely scan their environment for useful information using saccadic eye movements and/or coordinated movements of the eyes and other body segments such the head and the torso. Most previous eye movement studies were conducted with seated subject and showed that single saccades and sequences of saccades (e.g. double-step saccades) made to briefly flashed stimuli were equally accurate and precise. As one can easily appreciate, most gaze shifts performed daily by a given person are not produced from a seated position, but rather from a standing position either as subjects perform an action from an upright stance or as they walk from one place to another. In the experiments presented here, we developed a new dual-task paradigm in order to study the interaction between the gaze control system and the postural system. Healthy adults (n = 12) were required to both maintain balance and produce accurate single-step and double-step eye saccades from a standing position. Visually-induced changes in head sway were evoked using wide-field background stimuli that either moved in the mediolateral direction or in the anteroposterior direction. We found that, as in the seated condition, single- and double-step saccades were very precise and accurate when made from a standing position, but that a tighter control of head sway was necessary in the more complex double-step saccades condition for equivalent results to be obtained. Our perturbation results support the "common goal" hypothesis that state that if necessary, as was the case during the more complex oculomotor task, context-dependent modulations of the postural system can be triggered to reduced instability and therefore support the accomplishment of a suprapostural goal.

#### PDF Y Endnote Y

#### Is independence of older adults safe considering the risk of falls?

Talarska D, Strugała M, Szewczyk M, Tobis S, Michalak M, Wróblewska I, Wieczorowska-Tobis K. *BMC Geriatr.* 2017; 17(1): e66.

**Affiliation:** Department of Palliative Care, University of Medical Sciences, Laboratory of Geriatric Medicine, Poznań, Poland.

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**DOI** 10.1186/s12877-017-0461-0 **PMID** 28288563

#### Abstract

**BACKGROUND:** Falls affect approx. 30% of elderly population per year. They cause major injuries and reduce independence of the older adults' functioning. The main objective of the study was to evaluate the degree of independence and find the fall risk factors in the study group.

**METHODS:** The study included 506 - older adults. The study group included patients from GP clinics and members of two senior centers. The study duration was 12 months. Our study tools included EASY- Care Standard 2010 questionnaire, Abbreviated Mental Test Score (AMTS), Index Barthel, Instrumental Activities of Daily Living Scale (IADL), Geriatric Depression Scale (GDS), Timed Up and Go (TUG).

**RESULTS:** The study included 357 (70.6%) female and 149 (29.4%) male subjects. The mean age of the study group patients was 75.7 years  $\pm$  8.0. Most of the older adult subjects were independent in both basic (Index Barthel) and instrumental (IADL) activities. Gait fluency evaluated in TUG scale found slow and unsteady gait in 33.7% of the subjects. 27.5% of the subjects used mobility aids when walking. In the Risk of falls scale, 131 subjects (25.89%) were at risk of falls. According to logistic regression the main risk of fall determinants ( $p < 0.05$ ) in the study group were: age, previous falls, feet problems, lack of regular care, impaired vision, urinary incontinence, pain, sleeping disorders, and lowered mood.

**CONCLUSIONS:** Risk of falls increases in people less independent in terms of basic and complex life activities and in people with depression. Most of the risk factors can be modified. It is necessary to develop a standard procedure aimed at preventing falls in the elderly.

**PDF Y Endnote Y**

### **Orthostatic hypotension and falls**

Lipsitz LA.

*J. Am. Geriatr. Soc.* 2017; ePub(ePub): ePub.

**Affiliation:** Beth Israel Deaconess Medical Center, Boston, Massachusetts.

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**DOI** 10.1111/jgs.14745 **PMID** 28294283

**Abstract** [Abstract unavailable]

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### **Retention of the "first-trial effect" in gait-slip among community-living older adults**

Liu X, Bhatt T, Wang S, Yang F, Pai YC.

*Geroscience* 2017; 39(1): 93-102.

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**DOI** 10.1007/s11357-017-9963-0 **PMID** 28299643

#### **Abstract**

"First-trial effect" characterizes the rapid adaptive behavior that changes the performance outcome (from fall to non-fall) after merely a single exposure to postural disturbance. The purpose of this study was to investigate how long the first-trial effect could last. Seventy-five ( $\geq 65$  years) community-dwelling older adults, who were protected by an overhead full body harness system, were retested for a single slip 6-12 months after their initial exposure to a single gait-slip. Subjects' body kinematics that was used to compute their proactive (feedforward) and reactive (feedback) control of stability was recorded by an eight-camera motion analysis system. We found the laboratory falls of subjects on their retest slip were significantly lower than that on the novel initial slip, and the reactive stability of these subjects was also significantly improved. However, the proactive stability of subjects remains unchanged between their initial slip and retest slip. The fall rates and stability control had no difference among the 6-, 9-, and 12-month retest groups, which indicated a maximum retention on 12 months after a single slip in the laboratory. These results highlighted the importance of the "first-trial effect" and suggested that perturbation training is effective for fall prevention, with lower trial doses for a long period (up to 1 year). Therefore, single slip training might benefit those older adults who could not tolerate larger doses in reality.

**PDF Y Endnote Y**

### **Single and multiple step balance recovery responses can be different at first step lift-off following lateral waist-pull perturbations in older adults**

Fujimoto M, Bair WN, Rogers MW.

*J. Biomech.* 2017; ePub(ePub): ePub.

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### Abstract

An inability to recover lateral balance with a single step is predictive of future falls in older adults. This study investigated if balance stability at first step lift-off (FSLO) would be different between multiple and single stepping responses to lateral perturbations. 54 healthy older adults received left and right waist-pulls at 5 different intensities (levels 1-5). Crossover stepping responses at and above intensity level 3 that induced both single and multiple steps were analyzed. Whole-body center of mass (COM) and center of pressure (COP) positions in the medio-lateral direction with respect to the base of support were calculated. An inverted pendulum model was used to define the lateral stability boundary, which was also adjusted using the COP position at FSLO (functional boundary). No significant differences were detected in the COP positions between the responses at FSLO ( $p \geq 0.075$ ), indicating no difference in the functional boundaries between the responses. Significantly smaller stability margins were observed at first step landing for multiple steps at all levels ( $p \leq 0.024$ ), while stability margins were also significantly smaller at FSLO for level 3 and 4 ( $p \leq 0.048$ ). These findings indicate that although reduced stability at first foot contact would be associated with taking additional steps, stepping responses could also be attributable to the COM motion state as early as first step lift-off, preceding foot contact. Perturbation-based training interventions aimed at improving the reactive control of stability would reduce initial balance instability at first step lift-off and possibly the consequent need for multiple steps in response to balance perturbations.

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### PDF Y Endnote Y

### The effect of visual biofeedback on balance in elderly population: a systematic review

Alhasan H, Hood V, Mainwaring F.

*Clin. Interv. Aging* 2017; 12: 487-497.

**Affiliation:** School of Health Science, University of Nottingham, Nottingham, Nottinghamshire, UK.

(Copyright © 2017, Dove Medical Press)

DOI 10.2147/CIA.S127023 PMID 28293105 PMCID PMC5345985

### Abstract

**BACKGROUND:** Balance is commonly affected by multiple factors, especially among the elderly population. Visual biofeedback (VBF) is an intervention tool that can be used in balance rehabilitation.

**AIM:** This study aimed to systematically review randomized controlled trials that examine whether VBF training is effective in improving balance in an elderly population.

**DATA SOURCES:** Three databases were searched: CIAHL, EMBASE, and MEDLINE. The searches were limited to the period from 2010 to 2016.

**ELIGIBILITY CRITERIA:** Healthy adults, aged  $\geq 65$  years, with no specific disorders were included.

Interventions were any VBF intervention with the aim of improving balance and were compared to no intervention, traditional exercises, placebo, or standard care. The outcome measures were balance as measured by any validated outcome measure. **STUDIES APPRAISAL METHOD:** The Physiotherapy Evidence Database quality assessment tool and The Cochrane Collaboration tool for assessing risk of bias were used by two independent authors (HA and FM) in order to appraise the included studies.

**RESULTS:** The database search resulted in 879 articles, of which five papers were included. VBF was

compared to no intervention, a placebo, and traditional exercise. The total number of participants in all the five included studies was 181, with a mean age of 74.3 years (standard deviation 6.7). Two studies were rated as high-quality studies, and three were rated as fair quality.

**CONCLUSION:** Engaging elderly people living in the community in VBF training was found to be effective and could improve their balance ability. However, the variation between studies in methodology, intervention protocol, and outcomes utilized made it difficult to inform a definitive statement regarding the potential application of VBF for balance training with the elderly.

Furthermore, high-quality randomized control trials are required. The systematic review level of evidence is moderate, and the strength of recommendation is that VBF is likely to be beneficial.

#### **PDF Y Endnote Y**

#### **The use of non-slip socks to prevent falls among hospitalized older adults: A literature review**

Hartung B, Lalonde M.

*Geriatr. Nurs.* 2017; ePub(ePub): ePub.

**Affiliation:** School of Nursing, University of Ottawa, Canada.

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**DOI** 10.1016/j.gerinurse.2017.02.002 **PMID** 28285830

#### **Abstract**

Falls among hospitalized older adults are a growing concern. Hospitals are using non-slip socks as an alternative footwear to help prevent falls, however there is limited evidence to support their use.

The aim of this article is to review the literature on the effectiveness of non-slip socks to determine if there is sufficient evidence to support their use in the prevention of falls among hospitalized older adults. A comprehensive literature search was conducted using Medline, CINAHL, Scopus, PubMed and the Cochrane Library. Six studies were included in this review. The results suggested that there is inconclusive evidence to support the use of non-slip socks to prevent falls among hospitalized older adults. Non-slip socks do not possess the properties of adequate footwear and have the potential to spread infection. The patient's personal footwear from home is the safest footwear option while admitted into hospital.

#### **PDF Y Endnote Y**

#### **Traumatic facial injuries among elderly nursing home residents: never event or frequent occurrence?**

Bobian M, El-Kashlan N, Hanba CJ, Svider PF, Folbe AJ, Eloy JA, Zuliani GF, Carron M.

*JAMA Otolaryngol. Head Neck Surg.* 2017; ePub(ePub): ePub.

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#### **Abstract**

**IMPORTANCE:** As the nursing home population continues to increase, an understanding of preventable injuries becomes exceedingly important. Although other fall-related injuries have been characterized, little attention has been dedicated to facial trauma.

**OBJECTIVES:** To estimate the incidence of facial trauma among nursing home residents and detail mechanisms of injury, injury characteristics, and patient demographic data.

**DESIGN, SETTING, AND PARTICIPANTS:** The National Electronic Injury Surveillance System was used to calculate a weighted national incidence of facial trauma among individuals older than 60 years from a nationally representative collection of emergency departments from January 1, 2011, through December 31, 2015. Entries were screened for nursing home residents, and diagnosis, anatomical site, demographic data, and mechanism of injury were analyzed.

**RESULTS:** There were 109 795 nursing home residents (median age, 84.1 years; interquartile range, 79-89 years; 71 466 women [65.1%]) who required emergency department care for facial trauma. Women sustained a greater proportion of injuries with increasing age. The most common injuries were lacerations (48 679 [44.3%]), other soft-tissue injuries (45 911 [41.8%]; avulsions, contusions, and hematomas), and fractures (13 814 [12.6%]). Nasal (9331 [67.5%]) and orbital (1144 [8.3%]) fractures were the most common sites. The most common injury causes were direct contact with structural housing elements or fixed items (62 604 [57.0%]) and transfer to and from bed (24 870 [22.6%]).

**CONCLUSIONS AND RELEVANCE:** Despite falls being considered a Centers for Medicare & Medicaid Services preventable never event in hospitals, our analysis in the nursing home setting found more than 100 000 facial injuries during 5 years, suggesting these underappreciated injuries contribute substantially to health care expenditures. Although structural elements facilitated the greatest number of falls, transfer to and from bed remains a significant mechanism, suggesting an area for intervention.

**PDF Y Endnote Y**

### **Virtual reality training with three-dimensional video games improves postural balance and lower extremity strength in community-dwelling older adults**

Lee Y, Choi W, Lee K, Song C, Lee S.

*J. Aging Phys. Act.* 2017; ePub(ePub): ePub.

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(Copyright © 2017, Human Kinetics Publishers)

**DOI** 10.1123/japa.2015-0271 **PMID** 28290746

#### **Abstract**

Avatar-based three-dimensional technology is a new approach to improve physical function in older adults. The aim of this study was to use three-dimensional video gaming technology in virtual reality training to improve postural balance and lower extremity strength in a population of community-dwelling older adults. The experimental group participated in the virtual reality training program for 60 minutes, twice a week, for 6 weeks. Both experimental and control groups were given 3 times for falls prevention education at the first, third, and fifth weeks. The experimental group showed significant improvements not only in static and dynamic postural balance but also lower extremity strength ( $p < .05$ ). Furthermore, the experimental group was improved to overall parameters compared with control group ( $p < .05$ ). Therefore, three-dimensional video gaming technology might be beneficial for improving postural balance, and lower extremity strength in community-dwelling older adults.

**PDF Y Endnote Y**

### **An integrative review of pediatric fall risk assessment tools**

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*J. Pediatr. Nurs.* 2017; ePub(ePub): ePub.

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#### **Abstract**

**PROBLEM:** Patient fall prevention begins with accurate risk assessment. However, sustained improvements in prevention and quality of care include use of validated fall risk assessment tools (FRATs). The goal of FRATs is to identify patients at highest risk. Adult FRATs are often borrowed from to create tools for pediatric patients. Though factors associated with pediatric falls in the hospital setting are similar to those in adults, such as mobility, medication use, and cognitive impairment, adult FRATs and the factors associated with them do not adequately assess risk in children.

**ELIGIBILITY CRITERIA:** Articles were limited to English language, ages 0-21years, and publish date 2006-2015.

**SAMPLE:** The search yielded 22 articles. Ten were excluded as the population was primarily adult or lacked discussion of a FRAT. Critical appraisal and findings were synthesized using the Johns Hopkins Nursing evidence appraisal system.

**RESULTS:** Twelve articles relevant to fall prevention in the pediatric hospital setting that discussed fall risk assessment and use of a FRAT were reviewed. Comparison between and accuracy of FRATs is challenged when different classifications, definitions, risk stratification, and inclusion criteria are used.

**CONCLUSIONS:** Though there are several pediatric FRATs published in the literature, none have been found to be reliable and valid across institutions and diverse populations.

**IMPLICATIONS:** This integrative review highlights the importance of choosing a FRAT based on an institution's identified risk factors and validating the tool for one's own patient population as well as using the tool in conjunction with nursing clinical judgment to guide interventions.

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#### **PDF Y Endnote Y**

### **Auditory contributions to maintaining balance**

Stevens MN, Barbour DL, Gronski MP, Hullar TE.

*J. Vestib. Res.* 2016; 26(5-6): 433-438.

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(Copyright © 2016, IOS Press)

**DOI** 10.3233/VES-160599 **PMID** 28262648

#### **Abstract**

Maintaining balance relies on integration of inputs from the visual, vestibular, and proprioceptive systems. The auditory system has not been credited with a similar contributory role, despite its ability to provide spatial orienting cues with extreme speed and accuracy. Here, we determined the ability of external auditory signals to reduce postural sway, measured as the root-mean-square velocity of center of pressure of a standing subject, in a series of subjects with varying levels of

imbalance standing in the dark. The maximum root-mean-square center of pressure among our subjects decreased from 7.0 cm/sec in silence to 4.7 cm/sec. with the addition of external sound. The addition of sound allowed subjects to decrease sway by 41 percent. The amount of improvement due to sound was 54% of the amount of improvement observed in postural sway when visual cues only were provided to subjects standing in silence. These data support the significant effect of the auditory system in providing balance-related cues and suggest that interventions such as hearing aids or cochlear implants may be useful in improving postural stability and reducing falls.

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#### **Center of pressure and center of mass behavior during gait initiation on inclined surfaces: a statistical parametric mapping analysis**

Vieira MF, de Brito AA, Lehnen GC, Rodrigues FB.

*J. Biomech.* 2017; ePub(ePub): ePub.

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#### **Abstract**

This study analyzed gait initiation (GI) on inclined surfaces with 68 young adult subjects of both sexes. Ground reaction forces and moments were collected using two AMTI force platforms, of which one was in a horizontal position and the other was inclined by 8% in relation to the horizontal plane. Departing from a standing position, each participant executed three trials in the following conditions: horizontal position (HOR), inclined position at ankle dorsi-flexion (UP), and inclined position at ankle plantar-flexion (DOWN). Statistical parametric mapping analysis was performed over the entire center of pressure (COP) and center of mass (COM) time series. COP excursion did not show significant differences in the medial-lateral (ML) direction in both inclined conditions, but it was greater in the anterior-posterior (AP) direction for both inclined conditions. COP velocities are smaller in discrete portions of GI for the UP and DOWN conditions. COM displacement was greater in the ML direction during anticipatory postural adjustments (APA) in the UP condition, and COM moves faster in the ML direction during APA in the UP condition but slower at the end of GI for both the UP and the DOWN conditions. The COP-COM vector showed a greater angle in the DOWN condition. We observed changes for COP and COM in GI in both the UP and the DOWN conditions, with the latter showing changes for a great extent of the task. Both the UP and the DOWN conditions showed increased COM displacement and velocity. The predominant characteristic during GI on inclined surfaces, including APA, appears to be the displacement of the COM.

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#### **Curved walking rehabilitation with a rotating treadmill in patients with Parkinson's disease: a proof of concept**

Godi M, Giardini M, Nardone A, Turcato AM, Caligari M, Pisano F, Schieppati M.

*Front. Neurol.* 2017; 8: e53.

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### Abstract

Training subjects to step-in-place eyes open on a rotating platform while maintaining a fixed body orientation in space [podokinetic stimulation (PKS)] produces a posteffect consisting in inadvertent turning around while stepping-in-place eyes closed [podokinetic after-rotation (PKAR)]. Since the rationale for rehabilitation of curved walking in Parkinson's disease is not fully known, we tested the hypothesis that repeated PKS favors the production of curved walking in these patients, who are uneasy with turning, even when straight walking is little affected. Fifteen patients participated in 10 training sessions distributed in 3 weeks. Both counterclockwise and clockwise PKS were randomly administered in each session. PKS velocity and duration were gradually increased over sessions. The velocity and duration of the following PKAR were assessed. All patients showed PKAR, which increased progressively in peak velocity and duration. In addition, before and at the end of the treatment, all patients walked overground along linear and circular trajectories. Post-training, the velocity of walking bouts increased, more so for the circular than the linear trajectory. Cadence was not affected. This study has shown that parkinsonian patients learn to produce turning while stepping when faced with appropriate training and that this capacity translates into improved overground curved walking.

PDF Y Endnote Y

### Evaluation of a gait assessment module using 3D motion capture technology

Baskwill AJ, Belli P, Kelleher L.

*Int. J. Ther. Massage Bodywork* 2017; 10(1): 3-9.

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### Abstract

**BACKGROUND:** Gait analysis is the study of human locomotion. In massage therapy, this observation is part of an assessment process that informs treatment planning. Massage therapy students must apply the theory of gait assessment to simulated patients. At Humber College, the gait assessment module traditionally consists of a textbook reading and a three-hour, in-class session in which students perform gait assessment on each other. In 2015, Humber College acquired a three-dimensional motion capture system.

**PURPOSE:** The purpose was to evaluate the use of 3D motion capture in a gait assessment module compared to the traditional gait assessment module.

**PARTICIPANTS:** Semester 2 massage therapy students who were enrolled in Massage Theory 2 (n = 38).

**RESEARCH DESIGN:** Quasi-experimental, wait-list comparison study.

**INTERVENTION:** The intervention group participated in an in-class session with a Qualisys motion capture system.

**MAIN OUTCOME MEASURES:** The outcomes included knowledge and application of gait assessment theory as measured by quizzes, and students' satisfaction as measured through a questionnaire.

**RESULTS:** There were no statistically significant differences in baseline and post-module knowledge between both groups (pre-module:  $p = .46$ ; post-module:  $p = .63$ ). There was also no difference between groups on the final application question ( $p = .13$ ). The intervention group enjoyed the in-

class session because they could visualize the content, whereas the comparison group enjoyed the interactivity of the session. The intervention group recommended adding the assessment of gait on their classmates to their experience. Both groups noted more time was needed for the gait assessment module.

**CONCLUSIONS:** Based on the results of this study, it is recommended that the gait assessment module combine both the traditional in-class session and the 3D motion capture system.

#### **PDF Y Endnote Y**

#### **Implementing a pain self-management protocol in home care: a cluster-randomized pragmatic trial**

Reid MC, Henderson CR, Trachtenberg MA, Beissner KL, Bach E, Barrón Y, Sridharan S, Murtaugh CM. *J. Am. Geriatr. Soc.* 2017; ePub(ePub): ePub.

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**DOI** 10.1111/jgs.14836 **PMID** 28276061

#### **Abstract**

**OBJECTIVES:** To determine the effectiveness of a cognitive-behavioral pain self-management (CBPSM) protocol delivered by physical therapists (PTs) for use by older adults with activity-limiting pain receiving home care.

**DESIGN:** A randomized pragmatic trial comparing delivery of the intervention plus usual care with usual care alone.

**SETTING:** Community.

**PARTICIPANTS:** Individuals aged 55 and older admitted with orders for physical therapy who endorsed activity-limiting pain and reported pain scores of 3 or greater on a scale from 0 to 10 (N = 588).

**INTERVENTION:** A CBPSM protocol delivered by PTs.

**MEASUREMENTS:** Primary outcomes were assessed at 60 days using validated measures of pain-related disability, pain intensity, gait speed, and number of activity of daily living (ADL) deficits.

**RESULTS:** Of 588 participants, 285 received care from a PT randomized to the intervention and 303 from a PT randomized to the usual care group. Both groups had significant reductions in pain-related disability, pain intensity, and ADL limitations and improved gait speed. No significant treatment differences were identified. There were no consistent treatment differences when interactions and subgroups were examined.

**CONCLUSION:** This real-world pragmatic trial found no effect of implementation of a pain self-management intervention in a home care setting. Despite the lack of positive findings, future studies are indicated to determine how similar protocols that have been found to be effective in efficacy studies can be successfully implemented in routine clinical care.

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#### **PDF Y Endnote Y**

#### **Injury deaths among U.S. females: CDC resources and programs**

Mack KA, Peterson C, Zhou C, MacConvery E, Wilkins N.

*J. Womens Health (Liebert)* 2017; ePub(ePub): ePub.



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### **Abstract**

Injury death rates are lower for women than for men at all ages, but we have a long way to go in understanding the circumstances of injury fatalities among females. This article presents resources that can be used to examine the most recent data on injury fatalities among females and highlights activities of CDC's Injury Center. The National Center for Injury Prevention and Control's (NCIPC's) Web-based Injury Statistics Query and Reporting System, an online surveillance database, can be used to examine injury deaths. We present examples that show the 2015 number of female fatal injuries by age group and injury cause and method, as well as a 2008-2014 county-level map of female fatal injury rates. In 2015, there were 68,572 injury fatalities of females of age  $\geq 1$  year, equivalent to 1 death every 7 minutes. Injuries were the leading cause of death for females of ages 1-41 years and the sixth-ranked cause of female death overall. Falls were the leading cause of injury death overall (and for women  $\geq 70$  years), unintentional poisonings were second, and motor vehicle traffic injuries were third. NCIPC funds national organizations, state health agencies, and other groups to develop, implement, and promote effective injury and violence prevention and control practices. Five key programs are discussed. Presenting data on injury fatalities is an essential element in identifying meaningful prevention efforts. Further investigation of the causes and impact of female injury fatalities can refine the public health approach to reduce this injury burden.

**PDF Y Endnote Y**

### **Low-impact flooring: does it reduce fall-related injuries?**

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*J. Am. Med. Dir. Assoc.* 2017; ePub(ePub): ePub.

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**DOI** 10.1016/j.jamda.2017.01.012 **PMID** 28279604

### **Abstract**

**OBJECTIVES:** To compare fall rates and injuries from falls on low-impact flooring (LIF) compared with a standard vinyl flooring.

**DESIGN:** Prospective, observational, nonrandomized controlled study.

**SETTING:** Subacute Older Persons Health ward (N = 20 beds).

**PARTICIPANTS:** Older inpatients.

**INTERVENTION:** Three different types of LIF.

**MEASUREMENTS:** All falls in the ward were prospectively monitored using incident reporting, noting location and consequences of each fall. Fall rates (per 1000 bed days) and injuries, were compared between bedroom falls on LIF against those occurring on standard vinyl flooring (controls).

**RESULTS:** Over 31 months, there were 278 bedroom falls (from 178 fallers). The bedroom fall rate (falls per 1000 bed days occupied) did not differ between the LIF and control groups (median 15 [IQR 8-18] versus 17 [IQR 9-23], respectively;  $P = .47$ ). However, fall-related injuries were significantly less frequent when they occurred on LIFs (22% of falls versus 34% of falls on control flooring;  $P = .02$ ).





Fractures occurred in 0.7% of falls in the LIF cohort versus 2.3% in the control cohort. Rolling resistance when moving heavier equipment, such as beds or hoists, was an issue for staff on LIF.

**CONCLUSIONS:** LIF significantly reduced fall-related injuries compared with a standard vinyl flooring, whereas they did not alter the overall risk of falling.

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