

**SafetyLit December 2, 2018**

**Can lifelike baby dolls reduce symptoms of anxiety, agitation, or aggression for people with dementia in long-term care? Findings from a pilot randomised controlled trial**

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**Abstract**

**OBJECTIVES:** To compare a lifelike baby doll intervention for reducing anxiety, agitation, and aggression in older people with dementia in long-term care (LTC), with usual facility care; and explore the perceptions of care staff about doll therapy.

**METHOD:** Pilot, mixed-methods, parallel, randomised controlled trial, with follow-up semi-structured interviews. Thirty-five residents from five LTC facilities in Queensland, Australia were randomised to the lifelike baby doll intervention (three, 30-minute, individual, non-facilitated sessions per week) or usual care. Outcomes were changes in levels of anxiety, agitation, and aggression after the 3-week intervention, and short-term effects at week 1. Following intention-to-treat principles, repeated measure MANOVA was undertaken. Qualitative interviews involved five staff.

**RESULTS:** The doll intervention did not significantly reduce residents' anxiety, agitation, or aggression when compared to usual care at weeks 3 (primary outcome) and 1 (secondary outcome). However, there was a significant group-by-time interaction for the outcome of pleasure - the doll group showed a greater increase in displays of pleasure at week 3 compared to baseline than usual care ( $F(1,31) = 4.400$ ,  $p = 0.044$ ; Cohen's  $d = 0.74$ ). Staff perceived benefits for residents included emotional comfort, a calming effect, and providing a purposeful activity. Perceived limitations were that doll therapy may only be suitable for some individuals, some of the time, and the potential for residents to care for the doll at the expense of their health.

**CONCLUSIONS:** Doll therapy can provide some residents with enjoyment and purposeful engagement. Further research should focus on understanding the individual characteristics and circumstances in which residents most benefit.

**PDF Y Endnote Y**

**Correction: On the internal reaction forces, energy absorption, and fracture in the hip during simulated sideways fall impact**

Fleps I, Enns-Bray WS, Guy P, Ferguson SJ, Crompton PA, Helgason B.

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**Abstract** [This corrects the article DOI: 10.1371/journal.pone.0200952].

**PDF Y Endnote Y**



## Effects of dynamic perturbation-based training on balance control of community-dwelling older adults

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*Sci. Rep.* 2018; 8(1): e17231.

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### Abstract

Walking is one of the daily activities that may cause falling in older adults. We developed a novel dynamic balance training program using a perturbation-based training on a custom-made treadmill, which can generate forward, backward, and lateral sway perturbations during walking. The purpose of this study was to investigate the changes in the balance performance of community-dwelling older adults after 8-weeks of perturbation-based balance training. A three-dimensional motion analysis system was used to collect kinematic and kinetic data. Seventeen community-dwelling older adults performed quiet standing with and without the balance perturbation. Biomechanical parameters such as center of pressure (COP) and center of mass (COM) were calculated. A paired t-test was used to compare the difference in balance performance before and after the training. After training, the results showed that the COM control of the older adults was significantly improved during quiet standing with perturbation, while the COP control during quiet standing without perturbation was not changed. The perturbation-based balance training exerted a positive effect on dynamic balance control in older adults. This translational research offers a new paradigm of balance training and can be applied to patient populations who have a high risk of falling.

### PDF Y Endnote Y

## Falls among physically active elderly in senior housings, Bangkok, Thailand: situations and perceptions

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### Abstract

**PURPOSE:** A mixed-method study aimed to assess situations in which falls occur including prevalence and associated risk factors of falls among physically active elderly who are at risk of experiencing a fall in senior housings, Bangkok, Thailand, and their perceptions regarding falls.

**PATIENTS AND METHODS:** In the first phase, a cross-sectional study was conducted on 64 physically active elderly senior housing residents. Data on sociodemographics, health status, Barthel Index (BI) of activities of daily living, and fall experiences were collected through face-to-face interviews. Data on balance scores were obtained from Time Up and Go (TUG) test and Berg Balance Scale (BBS). In the second phase, a qualitative study was conducted on 41 physically active elderly who had experienced falls. Data regarding perception on falls, fall preventions, and fall management, were



gathered through in-depth interviews from November 2017 to December 2017.

**RESULTS:** The prevalence of falls among participants in senior housings was 64.1%. Univariate analysis found that a higher BI was associated with fall ( $P<0.004$ ). Multivariate analysis using binary logistic regression showed that a higher BI (OR=6.00, 95% CI=1.24-29.10) together with  $\geq 2$  environmental hazards (OR=6.33, 95% CI=1.24-32.29) were associated with fall. The result from content analysis indicated that the elderly were aware that they were at risk of fall. In addition, the elderly also perceived that fall could be avoided even though they did not know how to prevent it.

**CONCLUSION:** The prevalence of fall among physically active elderly in senior housings was relatively high. A higher BI scale and having  $\geq 2$  environmental hazards were associated risk factors of falls. Although the elderly perceived that fall could be avoided, they did not know how to prevent it. The intervention that focuses on environmental modification, balancing enchantment, and education on fall prevention is highly required.

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**Falls at home: a community based study on awareness and prevention among adults**

Jacob PG, Rao RC, Kamath A, Pahwa V, Zeb J.

*Indian J. Public Health Dev.* 2017; 8(4): 351-357.

(Copyright © 2017, R. K. Sharma)

**DOI** 10.5958/0976-5506.2017.00368.0 **PMID** unavailable

**Abstract**

**BACKGROUND:** Owing to their widespread occurrence, deleterious impacts and consequences, falls continue to be a major public health challenge. As per WHO report 2016, an estimated 424, 000 fatal falls occur each year.

**OBJECTIVES:** To assess knowledge regarding risk factors and preventive practices for falls at home among rural households.

**MATERIAL & METHOD:** A community based cross sectional study was carried out in the field practice area of Department of Community Medicine, of a University Medical College. Total 316 households were surveyed and data relating to socio-demographic features, knowledge pertaining to risk factors and practice regarding measures taken for prevention of falls at home were documented.

**RESULTS:** Awareness regarding predisposing factors that could lead to falls were alcohol (87%), smooth polished flooring (80.7%), poorly lit room (68.4%) and being elderly (81.3%). Majority 229 (72.5%) reported that falls on stairs could be prevented by railings for staircase while 199 (63%) reported adhering to medical advice as preventive measure. The prevalence of fall episodes in the last one year was (21) 6.6%.

**CONCLUSIONS:** The awareness regarding predisposing factors and prevention of falls among the rural households was good. However, the knowledge had not translated into practice.

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**Frailty Index associates with GRIN2B in two representative samples from the United States and the United Kingdom**

Mekli K, Stevens A, Marshall AD, Arpawong TE, Phillips DF, Tampubolon G, Lee J, Prescott CA, Nazroo JY, Pendleton N.



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### Abstract

The concept of frailty has been used in the clinical and research field for more than two decades. It is usually described as a clinical state of heightened vulnerability to poor resolution of homeostasis after a stressor event, which thereby increases the risk of adverse outcomes, including falls, delirium, disability and mortality. Here we report the results of the first genome-wide association scan and comparative gene ontology analyses where we aimed to identify genes and pathways associated with the deficit model of frailty. We used a discovery-replication design with two independent, nationally representative samples of older adults. The square-root transformed Frailty Index (FI) was the outcome variable, and age and sex were included as covariates. We report one hit exceeding genome-wide significance: the rs6765037 A allele was significantly associated with a decrease in the square-root transformed FI score in the Discovery sample (beta = -0.01958,  $p = 2.14E-08$ ), without confirmation in the Replication sample. We also report a nominal replication: the rs7134291 A allele was significantly associated with a decrease in the square-root transformed FI score (Discovery sample: beta = -0.01021,  $p = 1.85E-06$ , Replication sample: beta = -0.005013,  $p = 0.03433$ ). These hits represent the KBTBD12 and the GRIN2B genes, respectively. Comparative gene ontology analysis identified the pathways 'Neuropathic pain signalling in dorsal horn neurons' and the 'GPCR-Mediated Nutrient Sensing in Enteroendocrine Cells', exceeding the  $p = 0.01$  significance in both samples, although this result does not survive correction for multiple testing. Considering the crucial role of GRIN2B in brain development, synaptic plasticity and cognition, this gene appears to be a potential candidate to play a role in frailty. In conclusion, we conducted genome-wide association scan and pathway analyses and have identified genes and pathways with potential roles in frailty. However, frailty is a complex condition. Therefore, further research is required to confirm our results and more thoroughly identify relevant biological mechanisms.

**PDF Y Endnote Y**

### Image-based fall detection and classification of a user with a walking support system

Taghvaei S, Kosuge K.

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### Abstract

The classification of visual human action is important in the development of systems that interact with humans. This study investigates an image-based classification of the human state while using a walking support system to improve the safety and dependability of these systems. We categorize the possible human behavior while utilizing a walker robot into eight states (i.e., sitting, standing, walking, and five falling types), and propose two different methods, namely, normal distribution and hidden Markov models (HMMs), to detect and recognize these states. The visual feature for the state classification is the centroid position of the upper body, which is extracted from the user's



depth images. The first method shows that the centroid position follows a normal distribution while walking, which can be adopted to detect any non-walking state. The second method implements HMMs to detect and recognize these states. We then measure and compare the performance of both methods. The classification results are employed to control the motion of a passive-type walker (called "RT Walker") by activating its brakes in non-walking states. Thus, the system can be used for sit/stand support and fall prevention. The experiments are performed with four subjects, including an experienced physiotherapist.

RESULTS show that the algorithm can be adapted to the new user's motion pattern within 40 s, with a fall detection rate of 96.25% and state classification rate of 81.0%. The proposed method can be implemented to other abnormality detection/classification applications that employ depth image-sensing devices.

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### Impact of a wearable device-based walking programs in rural older adults on physical activity and health outcomes: cohort study

Jang IY, Kim HR, Lee E, Jung HW, Park H, Cheon SH, Lee YS, Park YR.

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#### Abstract

**BACKGROUND:** Community-dwelling older adults living in rural areas are in a less favorable environment for health care compared with urban older adults. We believe that intermittent coaching through wearable devices can help optimize health care for older adults in medically limited environments.

**OBJECTIVE:** We aimed to evaluate whether a wearable device and mobile-based intermittent coaching or self-management could increase physical activity and health outcomes of small groups of older adults in rural areas.

**METHODS:** To address the above evaluation goal, we carried out the "Smart Walk" program, a health care model wherein a wearable device is used to promote self-exercise particularly among community-dwelling older adults managed by a community health center. We randomly selected older adults who had enrolled in a population-based, prospective cohort study of aging, the Aging Study of Pyeongchang Rural Area. The "Smart Walk" program was a 13-month program conducted from March 2017 to March 2018 and included 6 months of coaching, 1 month of rest, and 6 months of self-management. We evaluated differences in physical activity and health outcomes according to frailty status and conducted pre- and postanalyses of the Smart Walk program. We also performed intergroup analysis according to adherence of wearable devices.

**RESULTS:** We recruited 22 participants (11 robust and 11 prefrail older adults). The two groups were similar in most of the variables, except for age, frailty index, and Short Physical Performance Battery score associated with frailty criteria. After a 6-month coaching program, the prefrail group showed significant improvement in usual gait speed (mean 0.73 [SD 0.11] vs mean 0.96 [SD 0.27],  $P=.02$ ), International Physical Activity Questionnaire scores in kcal (mean 2790.36 [SD 2224.62] vs mean

7589.72 [SD 4452.52],  $P=.01$ ), and European Quality of Life-5 Dimensions score (mean 0.84 [SD 0.07] vs mean 0.90 [SD 0.07],  $P=.02$ ), although no significant improvement was found in the robust group. The average total step count was significantly different and was approximately four times higher in the coaching period than in the self-management period (5,584,295.83 vs 1,289,084.66,  $P<.001$ ). We found that participants in the "long-self" group who used the wearable device for the longest time showed increased body weight and body mass index by mean 0.65 (SD 1.317) and mean 0.097 (SD 0.513), respectively, compared with the other groups.

**CONCLUSIONS:** Our "Smart Walk" program improved physical fitness, anthropometric measurements, and geriatric assessment categories in a small group of older adults in rural areas with limited resources for monitoring. Further validation through various rural public health centers and in a large number of rural older adults is required.

©Il-Young Jang, Hae Reong Kim, Eunju Lee, Hee-Won Jung, Hyelim Park, Seon-Hee Cheon, Young Soo Lee, Yu Rang Park. Originally published in JMIR Mhealth and Uhealth (<http://mhealth.jmir.org>), 21.11.2018.

#### PDF Y Endnote Y

#### **Impact of atrial fibrillation on falls in older patients: which is a problem, existence or persistence?**

Arita T, Suzuki S, Yagi N, Otsuka T, Semba H, Kano H, Matsuno S, Kato Y, Uejima T, Oikawa Y, Matsuhama M, Yajima J, Yamashita T.

*J. Am. Med. Dir. Assoc.* 2018; ePub(ePub): ePub.

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#### **Abstract**

**OBJECTIVES:** Several studies have suggested a possible relationship between atrial fibrillation (AF) and falls. However, whether the relationship depends on AF types is unclear. We investigated the relationship between sustaining AF and falls.

**DESIGN:** Single hospital-based cohort study with a follow-up of falls within 3 years after baseline.

**SETTING AND PARTICIPANTS:** A total of 14,056 patients from our cohort between February 2010 and March 2016.

**MEASURES:** Incidence of falls within 3 years by baseline cardiac rhythm was measured, and we investigated the effects of AF types on incidence of falls.

**RESULTS:** The study population was divided into younger (<75 years old;  $n = 11,808$ ) and older ( $\geq 75$  years old;  $n = 2248$ ) groups, and then divided into 3 groups according to the baseline cardiac rhythm: sinus rhythm (SR), paroxysmal AF (PAF), and persistent AF (PeAF). There were more male patients in the PeAF group; these patients had more comorbidities both in the younger and older groups. The cumulative incidence rates of falls at 1 year in patients with SR, PAF, and PeAF were similar in the younger group (0.4%, 0.4%, and 0.6%, respectively;  $P = .496$ ), whereas those were significantly different in the older group (2.3%, 2.7%, and 5.0%, respectively;  $P = .024$ ). In multivariate analysis, both PAF [hazard ratio (HR) 1.179; 95% confidence interval (CI) 0.553-2.511, reference SR] and PeAF (HR 1.502; 95% CI 0.635-3.556) were not associated with falls in the younger group. In the older group, PeAF was independently associated with incidence of falls (HR 2.257; 95% CI 1.262-4.037), but PAF was not (HR 1.317; 95% CI 0.673-2.574).

CONCLUSIONS/IMPLICATIONS: PeAF, not PAF, was associated independently with falls in older patients, suggesting the possible effect of irregular beats on physical frailty in the older population. Copyright © 2018 AMDA – The Society for Post-Acute and Long-Term Care Medicine. Published by Elsevier Inc. All rights reserved.

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**Implementation of a co-designed physical activity program for older adults: positive impact when delivered at scale**

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*BMC Public Health* 2018; 18(1): e1289.

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**DOI** 10.1186/s12889-018-6210-2 **PMID** 30470209

**Abstract**

**BACKGROUND:** Despite known health benefits of physical activity (PA), older adults remain among the least physically active age group globally with 30-60% not meeting guidelines. In Canada, 87% do not meet recommended guidelines. To influence population health, interventions that are effective in small trials must be disseminated at scale. Despite evidence for efficacy, few PA interventions are scaled up to reach the wider community. In 2015, British Columbia (BC) Ministry of Health released a PA strategy where older adults were identified as a priority. In partnership with the Ministry, the Active Aging Research Team co-created a health promotion program called Choose to Move (CTM). CTM will be implemented in three phases at increasingly greater scale across BC. The objective of this study is to evaluate the effectiveness of CTM during Phase I (pilot) and Phase II (initial scale up) on PA, mobility, and social connectedness among older adults in BC, Canada.

**METHODS:** We used a type 2 hybrid effectiveness-implementation study design, and herein focus on effectiveness. The implementation evaluation will be published as a companion paper elsewhere. Two community delivery partner organizations delivered 56 CTM programs in 26 large and small urban locations across BC. Outcome measurement occurred at 0 (baseline), 3 (mid-intervention) and 6 (post-intervention) months. We collected survey data from all participants (n = 458; province-wide) and also conducted a subset evaluation (n = 209).

**RESULTS:** PA increased significantly during the active intervention phase (baseline-3 months) in younger (60-74 yrs.; + 1.6 days/week; p < 0.001) and older (≥75 yrs.; + 1.0 days/week; p < 0.001) participants. The increase was sustained at 6 months in younger participants only, who remained significantly more active than at baseline (+ 1.4 days/week; p < 0.001). Social exclusion indicators declined significantly in the younger group. Mobility and strength improved significantly at 3 months in the younger group, and in both groups at 6 months.

**CONCLUSIONS:** CTM adopted central tenets of implementation science that consider the complicated systems where interventions are delivered to improve public health. In this iteration of CTM we demonstrate that a partner-based health promotion intervention can be effectively implemented across settings to enhance PA, mobility and social connectedness in older adults.

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### **Incidence, outcomes, and recidivism of elderly patients admitted for isolated hip fracture**

Cabalatungan S, Divaris N, McCormack JE, Huang EC, Kamadoli R, Abdullah R, Vosswinkel JA, Jawa RS.

*J. Surg. Res.* 2018; 232: 257-265.

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#### **Abstract**

**INTRODUCTION:** Isolated hip fracture (IHF) is a common injury in the elderly after a fall. However, there is limited study on elderly IHF patients' subsequent hospitalization for a new injury, that is, trauma-related recidivism.

**METHODS:** A retrospective review of the trauma registry at an ACS level I trauma center was performed for all elderly (age  $\geq 65$  y) blunt trauma patients admitted between 2007 and 2017, with a focus on IHF patients. IHF was defined as a fracture of the femoral head, neck, and/or trochanteric region without any other injuries except minor soft tissue trauma after a fall.

**RESULTS:** Of the 4986 elderly blunt trauma admissions, 974 (19.5%) had an IHF. The rate of trauma-related recidivism was 8.9% (n = 87) for a second injury requiring hospitalization. The majority of recidivist (74.7%) and nonrecidivist (66.5%) patients were females. Hospital length of stay was similar at index admission (7 d for recidivists versus 8 d for nonrecidivists). The median interval between index hospitalization and admission for a second injury was 373 d (IQR 156-1002). The most common mechanism of injury at index admission (95.4%) and at second injury-related hospitalization (95.4%) was a low-level fall. Among recidivist patients at second admission, a second hip fracture was present in 34.5% and intracranial hemorrhage in 17.2%.

**CONCLUSIONS:** After initial admission for an IHF, 8.9% of patients were readmitted for a second injury, at a median time of approximately 1 y, overwhelmingly from a low-level fall. Emphasis on fall prevention programs and at index admission is recommended.

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### **Mental health and environmental factors associated with falls in the elderly in North India: a naturalistic community study**

Jindal HA, Duggal M, Jamir L, Sharma D, Kankaria A, Rohilla L, Avasthi A, Nehra R, Grover S.

*Asian J. Psychiatry* 2018; 39: 17-21.

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**DOI** 10.1016/j.ajp.2018.11.013 **PMID** 30472349

#### **Abstract**

**AIM:** To determine the prevalence of falls and to assess its relationship with cognitive deficits, depression, visual impairment and self-reported hearing impairment among the elderly.

**METHODS:** This was a community-based, cross-sectional study conducted in 52 villages in the Naraingarh and Barara block of Ambala district which involved 468 participants. A pretested





predesigned questionnaire was used to collect data regarding demographic profile, falls, and physical morbidities. Geriatric Depression Scale-Hindi, Hindi-mini-mental state examination, Snellen chart, Katz- Activity of Daily Living were used to collect data for depression, cognitive decline, vision and activity of daily living respectively.

**RESULTS:** The prevalence of falls was found to be 28.7%. An association was found between falls and slippery floors in the houses, hearing loss, vertigo, hypertension, use of multiple medications, depression and functional disability in univariate analysis. On multivariate regression analysis, slippery floors (OR = 2.28), use of multiple medications (OR = 1.71), hearing loss (OR = 1.83) and presence of depression (OR = 1.62) were found to be independent risk factors with falls.

**CONCLUSION:** There is high prevalence of falls among the elderly and these are commonly related to preventable factors. Appropriate environmental modifications and exercise programs can help reduce the rate of falls as well as injuries related to falls among the elderly.

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### **Monitoring multiple cortical regions during walking in young and older adults: dual-task response and comparison challenges**

Stuart S, Alcock L, Rochester L, Vitória R, Pantall A.

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#### **Abstract**

Performance of several tasks simultaneously (dual-tasks) is common in everyday walking. Studies indicate that dual-task walking performance declines with age together with cognitive function, but neural mechanisms underpinning deficits remain unclear. Recent developments in mobile imaging techniques, such as functional near infrared spectroscopy (fNIRS), allow real-time monitoring of cortical activity during walking. This study aimed to: 1) examine activity in motor and cognitive cortical regions when walking with a dual-task in young and older adults; and 2) determine the effect of cognition on dual-task cortical activity changes. Seventeen young ( $20.3 \pm 1.2$  years) and eighteen older adults ( $72.6 \pm 8.0$  years) performed dual-task conditions, lasting 5 min, with alternating 30-second experimental blocks. The primary outcome was cortical activity, assessed by measuring changes in oxygenated haemoglobin (HbO<sub>2</sub>) concentrations. Cortical regions of interest (ROI) included motor regions (premotor cortex (PMC), supplementary motor area (SMA), primary motor cortex (M1)), and cognitive regions (prefrontal cortex (PFC)). Cognitive domains were assessed using standard tests and accelerometers were used to extract gait features. Cortical activity increased with a dual-task in PMC, SMA and M1 but not in PFC regions across groups, with response most evident with initial task exposure. Older adults did not increase SMA activity with a dual-task to the same level as young adults. Dual-task cortical response was consistently associated with greater executive function across groups. In conclusion, both young and older adults responded in a similar manner to dual-task conditions. Dual-task walking activated multiple motor

regions in both groups, but no significant change occurred for cognitive region activation. Cortical activation with a dual-task related to executive function.

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**Risk of post-discharge fall-related injuries among adult patients with syncope: a nationwide cohort study**

Numé AK, Carlson N, Gerds TA, Holm E, Pallisgaard J, Søndergaard KB, Hansen ML, Vinther M, Hansen J, Gislason G, Torp-Pedersen C, Ruwald MH.

*PLoS One* 2018; 13(11): e0206936.

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**DOI** 10.1371/journal.pone.0206936 **PMID** 30462687

**Abstract**

**BACKGROUND:** Syncope could be related to high risk of falls and injury in adults, but documentation is sparse. We examined the association between syncope and subsequent fall-related injuries in a nationwide cohort.

**METHODS:** By cross-linkage of nationwide registers, all residents  $\geq 18$  years with a first-time diagnosis of syncope were identified between 1997-2012. Syncope patients were matched 1:1 with individuals from the general population. The absolute one-year risk of fall-related injuries, defined as fractures and traumatic head injuries requiring hospitalization, was calculated using Aalen-Johansen estimator. Ratios of the absolute one-year risk of fall-related injuries (ARR) were assessed by absolute risk regression analysis.

**RESULTS:** We identified 125,763 patients with syncope: median age 65 years (interquartile range 46-78). At one year, follow-up was complete for 99.8% where a total of 8394 (6.7%) patients sustained a fall-related injury requiring hospitalization, of which 1606 (19.1%) suffered hip fracture. In the reference group, 4049 (3.2%) persons had a fall-related injury. The one-year ARR of a fall-related injury was 1.79 (95% confidence interval 1.72-1.87,  $P < 0.001$ ) in patients with syncope compared with the reference group; however, increased ARR was not exclusively in older patients. Factors independently associated with increased ARR of fall-related injuries in the syncope population were: injury in past 12 months, 2.39 (2.26-2.53,  $P < 0.001$ ), injury in relation to the syncope episode, 1.62 (1.49-1.77,  $P < 0.001$ ), and depression, 1.37 (1.30-1.45,  $P < 0.001$ ).

**CONCLUSION:** Patients with syncope were at 80% increased risk of severe fall-related injuries within the year following discharge. Notably, increased risk was not exclusively in older patients.

**PDF Y Endnote Y**

**Use of a gaming platform for balance training following a stroke: a randomized trial**

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*Arch. Phys. Med. Rehabil.* 2018; ePub(ePub): ePub.

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### Abstract

**OBJECTIVE:** To evaluate a personal computer (PC) gaming platform as a means of improving postural balance in stroke patients. **PARTICIPANTS:** A total of 54 stroke patients were enrolled and randomly divided into experimental and control groups.

**DESIGN:** The experimental group underwent 12 weeks of rehabilitation involving playing PC games with the proposed gaming platform, whereas the control group played PC games with a computer mouse in the standing position. **INTERVENTIONS:** The experimental PC gaming platform allowed trunk movements in 3 directions, including lateral, downward, or upward reaching. **MAIN OUTCOME MEASURES:** Balance control was assessed before and after the intervention with the Midot Posture Scale Analyzer (a pressure platform), by measuring the center of pressure during quiet stance. The Berg Balance Scale, Fullerton Advanced Balance Scale, and timed up and go tests were used to evaluate functional balance.

**RESULTS:** Analysis of covariance was used to assess how the PC games improve balance abilities. There were significant differences between the experimental and control groups in the results of sway kinematics and functional balance tests. The experimental group showed greater improvement than the control group.

**CONCLUSION:** This new gaming platform with adaptive PC games could be a useful therapy to stroke rehabilitation in patients with postural imbalance.

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### Utility of four sarcopenia criteria for the prediction of falls-related hospitalization in older Australian women

Sim M, Prince RL, Scott D, Daly RM, Duque G, Inderjeeth CA, Zhu K, Woodman RJ, Hodgson JM, Lewis JR.

*Osteoporos. Int.* 2018; ePub(ePub): ePub.

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### Abstract

Numerous sarcopenia definitions are not associated with increased falls-related hospitalization risk over 5 years to 9.5 years in older community-dwelling Australian women. Measures of muscle strength and physical function, but not appendicular lean mass (measured by dual-energy X-ray absorptiometry) may help discriminate the risk of falls-related hospitalization.

**INTRODUCTION:** The aim of this prospective, population-based cohort study of 903 Caucasian-Australian women (mean age  $79.9 \pm 2.6$  years) was to compare the clinical utility of four sarcopenia definitions for the prediction of falls-related hospitalization over 9.5 years.

**METHODS:** The four definitions were the United States Foundation for the National Institutes of Health (FNIH), the European Working Group on Sarcopenia in Older People (EWGSOP), and modified FNIH (AUS-POP<sub>F</sub>) and EWGSOP (AUS-POP<sub>E</sub>) definitions using Australian population-specific cut points (< 2 SD below the mean of young healthy Australian women). Components of sarcopenia including



muscle strength, physical function, and appendicular lean mass (ALM) were quantified using hand grip strength, timed-up-and-go (TUG), and dual-energy X-ray absorptiometry (DXA), respectively. Incident 9.5-year falls-related hospitalization were captured by linked data.

**RESULTS:** Baseline prevalence of sarcopenia according to FNIH (9.4%), EWGSOP (24.1%), AUS-POP<sub>F</sub> (12.0%), and AUS-POP<sub>E</sub> (10.7%) differed substantially. Sarcopenia did not increase the relative hazard ratio (HR) for falls-related hospitalization before or after adjustment for age (aHR): FNIH aHR 1.00 95%CI (0.69-1.47), EWGSOP aHR 1.20 95%CI (0.93-1.54), AUS-POP<sub>F</sub> aHR 0.96 95%CI (0.68-1.35), and AUS-POP<sub>E</sub> aHR 1.33 95%CI (0.94-1.88). When examining individual components of sarcopenia, only muscle strength and physical function but not ALM (adjusted for height<sup>2</sup> or BMI) were associated with falls-related hospitalization.

**CONCLUSION:** Current definitions of sarcopenia were not associated with falls-related hospitalization risk in this cohort of community-dwelling older Australian women. Finally, measures of muscle strength and physical function, but not ALM (measured by DXA) may help discriminate the risk of falls-related hospitalization.

#### PDF Y Endnote Y

#### Validity of a novel, clinically relevant measure to differentiate functional power and movement velocity and discriminate fall history among older adults: a pilot investigation

Vincenzo JL, Gray M, Glenn JM.

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#### Abstract

**BACKGROUND AND OBJECTIVES:** Lower-body muscular power and movement velocity (MV) are associated with balance and physical function. The Tendo power analyzer (Tendo) is a portable device that calculates functional lower body power (FLBP) and MV. This reliable (Cronbach's  $\alpha = .98$ ) method is validated against motion capture analysis of functional lower body sit-to-stand power and velocity ( $r = .76$ ). However, the Tendo has not been utilized in discrimination or prediction of falls. We determined the discriminant validity of FLBP and MV among older adults based on the history of falls. These results lay the framework for longitudinal research in FLBP and MV in fall prediction/prevention.

**RESEARCH DESIGN AND METHODS:** Cross-sectional investigation examining differences between FLBP and MV during 5 sit-to-stands of 98 community-dwelling older adults (aged 77.5 years, 61% female) classified by the history of fall (no = 59, yes = 39). Participants completed 5 consecutive sit-to-stands (60-second rest between each) with FLBP and MV measured by the Tendo. Multivariate analysis of variance modeling determined between-group differences in functional lower body sit-to-stand average velocity, peak velocity, relative average power, and relative peak power. Binary and forward conditional logistic regression models determined the ability of each measure to discriminate fall history.

**RESULTS:** FLBP and MV were significantly lower in older adults with a fall history ( $p < .05$ ). Relative average power and peak power were 15% and 16% lower and average and peak velocity were 18% and 14% slower, respectively among fallers. Logistic regression indicated average velocity was the

best discriminator of fall history ( $p < .05$ ).

**DISCUSSION AND IMPLICATIONS:** The Tendo detects differences in FLBP and MV during a sit-to-stand while discriminating fall history. Future longitudinal studies should determine efficacy in fall prediction and applicability toward clinically relevant interventions for fall prevention.

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**What "moves" the populations most likely to be physically inactive-women and older adults?  
Evidence from Mueller, a mixed-use neighborhood in Austin, Texas**

Calise TV, Dejong W, Heren T, Wingerter C, Kohl HW.

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(Copyright © 2018, Human Kinetics Publishers)

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**Abstract**

**BACKGROUND:** Older age groups are less likely than their younger counterparts to be regularly active and women are even less active. Ecological models suggest that multiple levels of influence with each level influencing the next level impacts physical activity behaviors.

**METHODS:** Hierarchical multiple regressions were used to determine factors within and across the ecological model that predicted both total physical activity and walking for recreation.

**FINDINGS:** The overall predictors of total physical activity were different than those of walking for recreation, with the exception of dog ownership and perceived barriers. Gender and age were significant predictors of walking for recreation, but these associations were not present for total physical activity. Women and older adults walked more for recreation in a mixed-use community, Mueller, (and thus engaged in more total physical activity) compared with men and younger adults. **CONCLUSION:** Behavior-specific physical activity as well as total physical activity led to a better understanding of factors that may impact behavior among an overall aging population, especially women. This level of specificity is important in understanding specific factors that are associated with physical activity among vulnerable populations and can help guide the development of tailored, cost-effective, and efficient policies and interventions.

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**Characteristics of self-reported sleep and the risk of falls and fractures: the Women's Health Initiative (WHI)**

Cauley JA, Hovey KM, Stone KL, Andrews CA, Barbour KE, Hale L, Jackson RD, Johnson KC, LeBlanc ES, Li W, Zaslavsky O, Ochs-Balcom H, Wactawski-Wende J, Crandall CJ.

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**Abstract**

Sleep disturbances are common and may influence falls and fracture directly by influencing bone turnover and muscle strength or indirectly through high comorbidity or poor physical function. To investigate the association between self-reported sleep and falls and fractures, we prospectively

studied 157,306 women in the Women's Health Initiative (WHI) using information on sleep quality, sleep duration, and insomnia from questionnaires. Annual self-report of falling two or more times (ie, "recurrent falling") during each year of follow-up was modeled with repeated measures logistic regression models fit by generalized estimating equations. Cox proportional hazards models were used to investigate sleep disturbance and time to first fracture. We examined the risks of recurrent falls and fracture by sleep duration with 7 hours as referent. We examined the risks across categories of sleep disturbance, insomnia status, and sleep quality. The average follow-up time was 7.6 years for falls and 12.0 years for fractures. In multivariable adjusted models, including adjustment for comorbidity, medications, and physical function, women who were short ( $\leq 5$  hours) and long ( $\geq 10$  hours) sleepers had increased odds of recurrent falls (odds ratio [OR] 1.28; 95% confidence interval [CI], 1.23 to 1.34 and OR 1.25; 95% CI, 1.09 to 1.43, respectively). Poor sleep quality, insomnia, and more sleep disturbances were also associated with an increased odds of recurrent falls. Short sleep was associated with an increased risk of all fractures, and upper limb, lower limb, and central body fractures, but not hip fractures, with hazard ratios ranging from 1.10 to 1.13 ( $p < 0.05$ ). There was little association between other sleep characteristics and fracture. In conclusion, short and long sleep duration and poor sleep quality were independently associated with increased odds of recurrent falls. Short sleep was associated with modest increase in fractures. Future long-term trials of sleep interventions should include falls and fractures as endpoints. © 2018 American Society for Bone and Mineral Research.

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#### Initial balance in human standing postures: roles of the joint mechanisms

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#### Abstract

The static initial postures of standing before applying perturbations may affect the maintenance of postural balance. The goal of this article was to find the stable set of postures and then determine the roles of joint mechanisms. The set of posture was defined in a biomechanical model based on three joint angles of the lower limbs. Optimized inverse dynamics method was used to solve for muscle forces in a precise model of the human musculoskeletal system posed in 4096 static sets of posture using AnyBody software. Results showed that the overall body muscular activity in standing is reduced by knee flexion. Moderate knee angles between 20° and 60° provided safer postures against possible perturbations because of higher collaboration levels of the joint mechanisms. About 36% of the overall postural infeasibilities were attributed to the inability of the ankle muscles to more sustain the exerted loads. Although the roles of the joint mechanisms were closely dependent on the postures, there was no direct relation between the joint kinematics and activation levels of their supporting muscles. Lower extremity muscle groups collaborate to maintain the balance in a considerable number of static postures.

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### Physical performance and fall risk in persons with traumatic brain injury

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#### Abstract

Injuries sustained from traumatic brain injury (TBI) culminate in both cognitive and neuromuscular deficits. Patients often progress to higher functioning on the Rancho continuum even while mobility deficits persist. Although prior studies have examined physical performance among persons with chronic symptoms of TBI, less is known about the relatively acute phase of TBI as patients prepare for rehabilitation discharge. The aims of this cross-sectional study were to (a) compare balance and gait performance in 20 ambulant persons with moderate to severe TBI who were nearing rehabilitation discharge with their age-matched controls and (b) describe performance with thresholds for fall risk and community navigation. During a designed task circuit, 40 participants (20 persons with TBI and 20 controls) performed the Timed Up and Go (TUG), gait velocity, and Walking and Remembering tests. Balance testing included the Fullerton Advanced Balance Scale (FABS) and instrumented Modified Clinical Test for Sensory Interaction in Balance (MCTSIB). Statistical analyses included analysis of covariance for group comparisons and a multivariate analysis of covariance for MCTSIB sway velocities with anthropometric controls. The TBI group (mean [ M] age = 42, standard deviation [ SD] =19.5 years; 70% males) performed significantly more poorly on all mobility tests (  $p < .05$ ) and their scores reflected a potential fall risk. Gait velocity was significantly slower for the TBI versus control group (  $M = .96$ ,  $SD = 2.6$  vs.  $M = 1.5$ ,  $SD = 2.2$  m/s;  $p < .001$ ), including TUG times (  $M = 13.5$ ,  $SD = 4.9$  vs.  $M = 7.7$ ,  $SD = 1.4$ ;  $p < .001$ ). TBI participants also demonstrated significantly greater sway velocity on all MCTSIB conditions (  $p < .01$ ) and lower performance on the FABS (  $p < .001$ ). Performance indices indicate potential fall risk and community navigation compromise for individuals with moderate to severe TBI. Physical performance scores support the need for continued interventions to optimize functional mobility upon discharge.

#### PDF Y Endnote Y

### Risk of mortality in individuals with hip fracture and traumatic brain injury

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#### Abstract

**OBJECTIVES:** To estimate the prevalence of diagnosed traumatic brain injury (TBI) in individuals hospitalized with hip fracture and examine its association with all-cause mortality.

**DESIGN:** Nested cohort study.

**SETTING:** National sample of Medicare beneficiaries from 2006 to 2010.



**PARTICIPANTS:** Beneficiaries aged 65 and older hospitalized with hip fracture.

**MEASUREMENTS:** TBI at the time of hip fracture was defined using International Classification of Diseases, Ninth Revision, Clinical Modification codes. The main outcome was all-cause mortality during follow-up.

**RESULTS:** Prevalence of TBI in individuals with hip fracture was 2.7%. Absolute risk of mortality attributable to TBI in individuals with hip fracture was 15/100 person-years. TBI was significantly associated with risk of death in multivariable analysis (hazard ratio=1.24, 95% confidence interval=1.14-1.35).

**CONCLUSION:** TBI was associated with greater risk of mortality in individuals with hip fracture. Practitioners should consider evaluating for presence of TBI in this vulnerable population.

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