

## SafetyLit May 22, 2016

### A cross-sectional study of the association between mobility test performance and personality among older adults

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*BMC Geriatr.* 2016; 16(1): e105.

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#### Abstract

**BACKGROUND:** Falls among the elderly are a major public health challenge. The Timed-Up and Go (TUG) test is commonly used to identify older adults with mobility limitations. This study explored the association between TUG test results and personality among community-dwelling older adults. **METHODS:** This cross-sectional study included 85 older adults. Personality was evaluated with the Five Factor Model. Times to complete the TUG as a single task (TUGST) alone and also with an additional cognitive task i.e., dual-task (DT), were recorded. Ordinary least squares OLS regression models were used to examine the associations between personality factors and both single DT TUG. **RESULTS:** Extraversion was found to be inversely associated with time to complete the TUGST ( $\beta = -.26$ ,  $p < .05$ ). Conscientiousness was inversely associated with TUGDT ( $\beta = -.24$ ,  $p < .01$ ). **CONCLUSIONS:** Findings from this study highlight the relationship between personality and the TUG test. Specifically, older adults with high Extraversion completed the TUGST test more quickly than those who had lower measures of this trait and, people with high Conscientiousness completed the TUGDT tests more quickly. These findings may contribute to early identification of older adults at higher risk from mobility limitations and falls, and to developing personality-tailored interventions for fall prevention.

#### PDF Y Endnote Y

### Accelerometry-based gait characteristics evaluated using a smartphone and their association with fall risk in people with chronic stroke

Isho T, Tashiro H, Usuda S.

*J. Stroke Cerebrovasc. Dis.* 2015; 24(6): 1305-1311.

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**DOI** 10.1016/j.jstrokecerebrovasdis.2015.02.004 **PMID** 25881773

#### Abstract

**BACKGROUND:** The smartphone, which contains inertial sensors, is currently available and affordable device and has the potential to provide a self-assessment tool for health management. The aims of this study were to use a smartphone to record trunk acceleration during walking and to compare accelerometry variables between poststroke subjects with and without a history of falling. **METHODS:** This cross-sectional study was conducted in 2 day care centers for elderly adults. Twenty-four community-dwelling adults with chronic stroke (mean age,  $71.6 \pm 9.7$  years; mean time since stroke,  $68.5 \pm 38.7$  months) were enrolled. Acceleration of the trunk during walking was recorded in the anteroposterior and mediolateral directions and quantified using the autocorrelation coefficient, harmonic ratio, and interstride variability (coefficient of variation of root mean square acceleration). Fall history in the past 12 months was obtained by self-report.

**RESULTS:** Eleven participants (45.8%) reported at least one fall in the past 12 months and were classified as fallers. Fallers exhibited significantly higher interstride variability of mediolateral trunk acceleration than nonfallers. In the logistic regression analysis, interstride variability of mediolateral trunk acceleration was significantly associated with fall history (adjusted odds ratio, 1.462; 95% confidence interval, 1.009-2.120). The area under the receiver operating characteristic curve for interstride variability of mediolateral trunk acceleration to discriminate fallers from nonfallers was .745 (95% confidence interval, .527-.963).

**CONCLUSIONS:** The results suggest that quantitative gait assessment using a smartphone can provide detailed and objective information about subtle changes in the gait pattern of stroke subjects at risk of falling.

**PDF Y Endnote Y**

### **Accuracy of estimating step counts and intensity using accelerometers in older people with or without assistive devices**

Park J, Ishikawa-Takata K, Tanak S, Bessy K, Tanaka S, Kimurae T.

*J. Aging Phys. Act.* 2016; ePub(ePub): ePub.

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(Copyright © 2016, Human Kinetics Publishers)

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#### **Abstract**

The purpose of this study was to examine the accuracy of uni- and tri-axial accelerometers in monitoring step counts and gait intensity in older people who did or did not use an assistive device. Forty-nine healthy and frail older adults wore uni-axial (Lifecorder, Suzuken Co. Ltd.) and tri-axial accelerometers (Activity Monitor, Matsushita Electronic Works, Ltd., and Active Style Pro, Omron Healthcare Co., Ltd.) during three trials at different gait speeds. All accelerometers gave relatively accurate step counts for healthy older participants compared with direct observation; however, the error was greater for frail older people with assistive devices. Gait intensity detection error was unaffected by gait speed. Among frail older people with assistive devices, the gait intensity error was smaller than for step count error. To accurately assess the steps walked or the gait intensity among frail older people using assistive devices, more study is needed on these groups of participants.

**PDF Y Endnote Y**

### **Arthritis, depression, and falls among community-dwelling older adults: evidence from the Health and Retirement Study**

Quach LT, Burr JA.

*J. Appl. Gerontol.* 2016; ePub(ePub): ePub.

**Affiliation:** University of Massachusetts Boston, MA, USA.

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#### **Abstract**

The aims of this study were to examine the association between different types of arthritis and falls and to investigate whether clinically significant depression symptoms (CSDS) moderate these relationships. The study used nationally representative data from the 2008 Health and Retirement Study (n = 7,715, M age = 75, 62% female, and 90% White). Among the respondents, 42%

experienced at least one fall during the previous 2 years. About one third had some form of arthritis: 22% osteoarthritis (OA), 4.8% rheumatoid arthritis (RA), 2.3% both OA and RA, and 7.9% with other arthritis types. About one fifth of respondents had CSDS. OA and CSDS are associated with the odds of falling (17% and 29%, respectively), adjusting for socio-demographic characteristics, lifestyle, health conditions, and psychiatric medications. There was no statistically significant interaction between types of arthritis and CSDS. Health care providers should pay attention to managing arthritis, especially OA, and CSDS to prevent falls among older adults.

**PDF Y Endnote Y**

### **Association between social participation and instrumental activities of daily living among community-dwelling older adults**

Tomioka K, Kurumatani N, Hosoi H.

*J. Epidemiol.* 2016; ePub(ePub): ePub.

**Affiliation:** Nara Prefectural Health Research Center, Nara Medical University.

(Copyright © 2016, Japan Epidemiological Association)

**DOI** 10.2188/jea.JE20150253 **PMID** 27180933

#### **Abstract**

**BACKGROUND:** Population-based data examining the relationship between social participation (SP) and instrumental activities of daily living (IADL) are scarce. This study examined the cross-sectional relationship between SP and IADL in community-dwelling elderly persons.

**METHODS:** Self-administered questionnaires were mailed to 23 710 residents aged  $\geq 65$  years in Nara, Japan (response rate: 74.2%). Data from 14 956 respondents (6935 males and 8021 females) without dependency in basic activities of daily living (ADL) were analyzed. The number, type, and frequency of participation in social groups (SGs) were used to measure SP. SGs included volunteer groups, sports groups, hobby groups, senior citizens' clubs, neighborhood community associations, and cultural groups. IADL was evaluated using the Tokyo Metropolitan Institute of Gerontology Index of Competence. Logistic regression models stratified by gender were used.

**RESULTS:** After adjustment for putative confounding factors, including demographics, health status, life-style habits, ADL, depression, cognitive function, social networks, social support, and social roles, participation in various SGs among both genders was inversely associated with poor IADL, showing a significant dose-response relationship between an increasing number of SGs and a lower proportion of those with poor IADL ( $P$  for trend  $< 0.001$ ). A significant inverse association between frequent participation and poor IADL was observed for all types of SGs among females, whereas the association was limited to sports groups and senior citizens' clubs among males.

**CONCLUSIONS:** Our results show that participation in a variety of SGs is associated with independent IADL among the community-dwelling elderly, regardless of gender. However, the beneficial effects of frequent participation on IADL may be stronger for females than for males.

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### **Beyond strength: participant perspectives on the benefits of an older adult exercise program**

Kohn M, Belza B, Petrescu-Prahova M, Miyawaki CE.

*Health Educ. Behav.* 2016; 43(3): 305-312.

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## Abstract

This study examines the expected and experienced benefits among participants in Enhance®Fitness (EF), an evidence-based group physical activity program for older adults. We also describe the implications for program dissemination (reach, implementation, and maintenance) within the RE-AIM (reach, effectiveness, adoption, implementation, and maintenance) framework. Twenty semistructured interviews were conducted with EF participants enrolled from 2005 to 2012. Interviews were digitally recorded, professionally transcribed, and analyzed using a deductive approach. Participants were motivated to join EF for expected physical benefits and the social environment of a group-based class. Actualized benefits of participation included physical, social, functional, and improved self-image/sense of well-being. Participants valued the practical application of class exercises to daily activities that support independent living, such as lifting objects and completing household chores. Organizations looking to implement EF or improve existing EF classes can improve program reach, implementation, and maintenance by incorporating participants' expressed motivations and valued benefits in program marketing and by improving organizational support to meet participant needs. EF class instructors can tailor their classes to engage participants based on their motivations. Understanding participants' motivations and valued benefits can improve EF dissemination by meeting participant needs with tailored class offerings and organizational needs informed by participant insights that aid program sustainability.

## PDF Y Endnote Y

### Comparisons of different screening tools for identifying fracture/osteoporosis risk among community-dwelling older people

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*Medicine (Baltimore)* 2016; 95(20): e3415.

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## Abstract

A prospective study was conducted to compare criterion, predictive, and construct validities of 9 fracture/osteoporosis assessment tools, including calcaneal quantitative ultrasonography (QUS), Age Bulk One or Never Estrogens (ABONE), body weight criterion (BWC), Fracture Risk Assessment Tool (FRAX), Garvan fracture risk calculator (GARVAN), Osteoporosis Risk Assessment Instrument (ORAI), Osteoporosis Index of Risk (OSIRIS), Osteoporosis Self-Assessment Tool for Asians (OSTA), and Simple Calculated Osteoporosis Risk Estimation (SCORE), among older men and women in Taiwan. Using the femoral neck dual-energy x-ray absorptiometry (DXA) T-score as an external criterion, the sensitivity, specificity, positive and negative predictive values, positive and negative likelihood ratios, and the area under the receiver operating characteristic curve (AUC) for each tool were calculated. The ability of these tools to predict injurious falls was examined. A principal component analysis was applied to understand whether these tools were measuring the same underlying construct. The FRAX, BWC, ORAI, OSIRIS, OSTA, and SCORE had AUCs of  $\geq 0.8$  in men, while

the GARVAN, OSIRIS, OSTA, and SCORE had AUCs of  $\geq 0.8$  in women. The sensitivity, negative predictive value, and likelihood ratio of the ABONE, BWC, ORAI, OSIRIS, OSTA, and SCORE tools in both men and women were 100%,  $\geq 90\%$ , and 0.0, respectively; the specificity and positive predictive value and likelihood ratio were far from satisfactory. The GARVAN displayed the best predictive ability of a fall in both men (AUCs, 0.653-0.686) and women (AUCs, 0.560-0.567), despite being smaller in women. The 9 screening tools and 2 central DXA measurements assessed 5 different factors, while the ABONE, BWC, ORAI, OSIRIS, OSTA, and SCORE measured the same one. Simple self-assessment tools can serve as initial screening instruments to rule out persons who have osteoporosis; however, these tools may measure a different construct other than fracture/osteoporosis risk.

**PDF Y Endnote Y**

**Evaluation of two new indices of blood pressure variability using postural change in older fallers**

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*Medicine (Baltimore)* 2016; 95(19): e3614.

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**Abstract**

To evaluate the utility of blood pressure variability (BPV) calculated using previously published and newly introduced indices using the variables falls and age as comparators. While postural hypotension has long been considered a risk factor for falls, there is currently no documented evidence on the relationship between BPV and falls. A case-controlled study involving 25 fallers and 25 nonfallers was conducted. Systolic (SBPV) and diastolic blood pressure variability (DBPV) were assessed using 5 indices: standard deviation (SD), standard deviation of most stable continuous 120 beats (staSD), average real variability (ARV), root mean square of real variability (RMSRV), and standard deviation of real variability (SDRV). Continuous beat-to-beat blood pressure was recorded during 10 minutes' supine rest and 3 minutes' standing. Standing SBPV was significantly higher than supine SBPV using 4 indices in both groups. The standing-to-supine-BPV ratio (SSR) was then computed for each subject (staSD, ARV, RMSRV, and SDRV). Standing-to-supine ratio for SBPV was significantly higher among fallers compared to nonfallers using RMSRV and SDRV ( $P=0.034$  and  $P=0.025$ ). Using linear discriminant analysis (LDA), 3 indices (ARV, RMSRV, and SDRV) of SSR SBPV provided accuracies of 61.6%, 61.2%, and 60.0% for the prediction of falls which is comparable with timed-up and go (TUG), 64.4%. This study suggests that SSR SBPV using RMSRV and SDRV is a potential predictor for falls among older patients, and deserves further evaluation in larger prospective studies.

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### **Influence of frailty phenotype items on functional capacity and falls occurrence in frail community-dwelling older adults: analysis of FIBRA Study**

Azevedo da Silva SL, Viana JU, Neri AL, Ferriolli E, Lourenço RA, Dias RC.

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#### **Abstract**

**BACKGROUND:** Items of frailty phenotype and frailty load can differently influence functional capacity and risk of falls in frail older adults.

**METHODS:** The FIBRA study is a cross-sectional, multicentric, and multidisciplinary investigation of 617 community-dwelling older adults from Brazil considered frail by the frailty phenotype.

**RESULTS AND CONCLUSION:** Functional capacity for basic activities of daily living was different for those older adults positive at gait slowness ( $P = .002$ ); for instrumental activities of daily living differences occurred for 4 positive items; for falls differences appeared only for gait slowness ( $P = .30$ ). As older adults are considered frail, frailty load is not strongly associated with functional capacity and falls occurrence.

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

### **Motor performance and physical activity as predictors of prospective falls in community-dwelling older adults by frailty level: application of wearable technology**

Mohler MJ, Wendel CS, Taylor-Piliae RE, Toosizadeh N, Najafi B.

*Gerontology* 2016; ePub(ePub): ePub.

**Affiliation:** Arizona Center on Aging, College of Medicine, University of Arizona, Tucson, Ariz., USA.

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#### **Abstract**

**BACKGROUND:** Few studies of the association between prospective falls and sensor-based measures of motor performance and physical activity (PA) have evaluated subgroups of frailty status separately.

**OBJECTIVE:** To evaluate wearable sensor-based measures of gait, balance, and PA that are predictive of future falls in community-dwelling older adults.

**METHODS:** The Arizona Frailty Cohort Study in Tucson, Arizona, followed community-dwelling adults aged 65 years and over (without baseline cognitive deficit, severe movement disorders, or recent stroke) for falls over 6 months. Baseline measures included Fried frailty criteria: in-home and sensor-based gait (normal and fast walk), balance (bipedal eyes open and eyes closed), and spontaneous daily PA over 48 h, measured using validated wearable technologies.

**RESULTS:** Of the 119 participants (36% non-frail, 48% pre-frail, and 16% frail), 48 reported one or more fall (47% of non-frail, 33% of pre-frail, and 47% of frail). Although balance deficit and PA were independent fall predictors in pre-frail and frail groups, they were not sensitive to predict prospective falls in the non-frail group. Even though gait performance deteriorated as frailty increased, gait was not a predictor of prospective falls when participants were stratified based on frailty status. In pre-frail and frail participants combined, center of mass sway [odds ratio (OR) = 5.9, 95% confidence interval (CI) 2.6-13.7], PA mean walking bout duration (OR = 1.1, 95% CI 1.0-1.2), PA mean standing bout duration (OR = 0.94, 95% CI 0.91-0.99), and a fall in previous 6 months (OR = 7.3, 95% CI 1.5-36.4) were independent predictors of prospective falls (area under the curve: 0.882).



**CONCLUSION:** This study suggests that independent predictors of falls are dependent on frailty status. Among sensor-derived parameters, balance deficit, longer typical walking episodes, and shorter typical standing episodes were the most sensitive predictors of prospective falls in the combined pre-frail and frail sample. Gait deficit was not a sensitive fall predictor in the context of frailty status.

**PDF N Endnote Y**

### **Performance-based impairment measures as predictors of early-stage activity limitations in community-dwelling older adults**

Terhorst L, Holm MB, Toto PE, Rogers JC.

*J. Aging Health* 2016; ePub(ePub): ePub.

**Affiliation:** University of Pittsburgh, PA, USA.

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#### **Abstract**

**OBJECTIVE:** The objective of the current investigation was to explore performance-based predictors of decline in the performance quality of everyday tasks as a first step for early identification, screening, and referral to minimize disability in community-dwelling older adults.

**METHOD:** This was a secondary analysis of data from 256 community-based older women. Mobility, activities of daily living (ADLs), and instrumental activities of daily living (IADLs) were measured using the Performance Assessment of Self-Care Skills (PASS). Logistic regression models explored cognitive and motor predictors of performance quality while controlling for demographics and diagnoses.

**RESULTS:** Functional reach ( $p = .049$ ) and cognition ( $p = .012$ ) were predictive of mobility quality, whereas balance ( $p = .007$ ) and the Keitel Function ( $p = .005$ ) were predictive of ADL quality.

Manipulation and cognitive measures were predictive of cognitive and physical IADL quality.

**DISCUSSION:** Cognitive and physical screens are both important to identify older adults at risk for disability.

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### **Prevalence of fear of falling in older adults, and its associations with clinical, functional and psychosocial factors: the Frailty in Brazilian Older People-Rio de Janeiro Study**

Malini FM, Lourenço RA, Lopes CS.

*Geriatr. Gerontol. Int.* 2016; 16(3): 336-344.

(Copyright © 2016, Japan Geriatrics Society, Publisher John Wiley and Sons)

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#### **Abstract**

**AIM:** The present study estimated the prevalence of fear of falling in older adults, and its associations with clinical, functional and psychosocial factors.

**METHODS:** Data from the Research Network Frailty in Brazilian Older People, specifically the Rio de Janeiro Study involving participants aged 65 years and older residing in the city of Rio de Janeiro, Brazil, were analyzed. Fear of falling was assessed by the Brazilian version of Falls Efficacy Scale-International. The following variables were assessed: history of falls, fracture after fall, number of comorbidities, number of medications, hospitalization in the previous year, use of walking support device, functional dependency in activities of daily living (including instrumental activities), hearing

and visual impairments, hand grip strength, walking speed, self-rated health, depressive symptoms, cognitive impairment, living alone, social support, and activity level. Associations were evaluated by multiple logistic regression.

**RESULTS:** Among the 742 participants, 51.9% had a fear of falling, which was more prevalent in women and older participants. Fear of falling was associated with a history of one to two falls (odds ratio [OR] 2.18; 95% confidence interval [CI] 1.42-3.36), three or more falls (OR 2.72, 95% CI 1.10-6.70), use of seven or more medications (OR 1.70, 95%CI 1.04-2.80), hearing impairment (OR 1.66, 95% CI 1.10-2.49), functional dependence in activities of daily living (OR 1.73, 95% CI 1.07-2.79), diminished gait speed (OR 1.64 95% CI 1.04-2.58), fair self-rated health (OR 1.89, 95% CI, 1.30-2.74), poor/very poor self-rated health (OR 4.92, 95% CI 1.49-16.27) and depressive symptoms (OR 1.68, 95% CI 1.07-2.63).

**CONCLUSIONS:** The prevalence of fear of falling was high in this population, and was associated with history of falls, use of seven or more medications, hearing impairment, functional dependency in activities of daily living, diminished walking speed, fair and poor/very poor self-rated health and depressive symptoms.

**PDF Y Endnote Y**

### **Prevalence of risk factors for falls among elderly people living in long-term care homes**

Dhargave P, Sendhilkumar R.

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(Copyright © 2016, Asia Pacific League of Clinical Gerontology and Geriatrics, Publisher Elsevier Publishers)

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#### **Abstract**

**BACKGROUND:** Falls are common among the geriatric population, causing frequent morbidity and mortality. There is an increased risk of fall among older people living in long-term care homes. Identifying risk factors for falls among older people living in old-age homes can help in the care and prevention of falls in this population.

**AIM:** To evaluate the prevalence of various risk factors for falls among older people living in long-term care homes.

**METHODS:** A total of 163 elderly men and women aged 60-95 years were studied. History of falls revealed by participants, Long Term Care Fall Risk Assessment Form, Mini Mental State Examination, Berg Balance Scale, Fall Factors Assessment Form, and Dynamic Gait Index were used as the assessment tools in this study. The odds ratio for the risk factors for falls was calculated. The association between the risk of fall and the risk factors was assessed using the  $\chi^2$  test. The degree of functional disability between the high-risk and low-risk groups was analyzed using an independent t test.

**RESULTS;** The following risk factors were significantly associated will falls: poor vision [odds ratio (OR) = 1.851], chronic conditions (OR = 1.633), vertigo (OR = 2.237), imbalance (OR = 3.105), fear of falling (OR = 3.227), and previous falls (OR = 5.661) (all  $p < 0.001$ ). There was a significant difference between high-risk and low-risk groups for all functional and cognitive measures: Long Term Care Fall Risk Assessment ( $t = 20.824$ ), Mini Mental State Examination ( $t = -6.18$ ), Berg Balance Scale ( $t = -12.59$ ) and Dynamic Gait Index ( $t = -14.7$ ) (all  $p < 0.001$ ).

**CONCLUSION:** We found that history of falls, poor vision, use of multiple medications, chronic



diseases, use of walking aids, vertigo, and balance problems were associated with falls among the elderly population living in long-term care homes. Women had a higher risk of falls than men.

**PDF Y Endnote Y**

**Psychoactive prescribing for older people--what difference does 15 years make?**

Hughes LD, Cochrane L, McMurdo MET, Guthrie B.

*Int. J. Geriatr. Psychiatry* 2016; 31(1): 49-57.

(Copyright © 2016, John Wiley and Sons)

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**Abstract**

**OBJECTIVE:** The objective of the study was to review prescribing of psychoactive medications for older residents of the Tayside region of Scotland.

**METHODS:** The analysis used community prescribing data in 1995 and 2010 for all older residents in Tayside. For each psychoactive drug class, the name of the most recently prescribed drug and the date prescribed were extracted. The relative risk (RR) and 95% confidence intervals (CI) for patients receiving psychoactive medication in 2010 were compared with those for patients in 1995.

Psychoactive prescribing was analyzed by year, age, gender, and deprivation classification. The chi-squared test was used to calculate statistical significance.

**RESULTS:** Total psychoactive prescribing in people over the age of 65 years has increased comparing 1995 with 2010. Antidepressant [RR = 2.5 (95% CI 2.41-2.59)  $p < 0.001$ ] and opioid analgesia [RR = 1.21 (1.19-1.24)  $p < 0.001$ ] prescriptions increased between 1995 and 2010.

Hypnotics/anxiolytic [RR = 0.69 (0.66-0.71)  $p < 0.001$ ] and antipsychotic [RR = 0.83 (0.77-0.88)  $p < 0.001$ ] prescriptions decreased between 1995 and 2010. An increase in psychoactive prescribing is particularly marked in lower socioeconomic groups. Patients in the least affluent fifth of the population had RR = 1.25 (1.20-1.29) [ $p < 0.001$ ] of being prescribed one to two psychoactive medications and RR = 1.81 (1.56-2.10) [ $p < 0.001$ ] of being prescribed three or more psychoactive medications in 2010 compared with those in 1995. The RRs for the most affluent fifth were RR = 1.14 (1.1-1.19) [ $p < 0.001$ ] and RR = 1.2 (1.01-1.42) [ $p < 0.001$ ] for one to two, and three or more medications, respectively.

**CONCLUSION:** Psychoactive medication prescribing has increased comparing 1995 with 2010, with increases disproportionately affecting patients in lower socioeconomic groups. The availability of new psychoactive drugs, safety concerns, and economic factors may explain these increases.

**PDF Y Endnote Y**

**Recognising falls risk in older adult mental health patients and acknowledging the difference from the general older adult population**

Wynaden D, Tohotoa J, Heslop K, Al Omari O.

*Collegian* 2016; 23(1): 97-102.

(Copyright © 2016, Royal College of Nursing, Australia, Publisher Ink Press International)

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**Abstract**

Older adults admitted to inpatient mental health units present with complex mental health care needs which are often compounded by the challenges of living with physical co-morbidities. They are a mobile population and a high risk group for falling during hospitalisation. To address quality and

safety concerns around the increased risk for falls, a qualitative research study was completed to obtain an improved understanding of the factors that increase the risk of falling in this patient cohort. Focus groups were conducted with mental health professionals working across older adult mental health services in metropolitan Western Australia. Data were analysed using content analysis and three themes emerged that were significant concepts relevant to falls risk in this patient group. These themes were (1) limitations of using generic falls risk assessment and management tools, (2) assessment of falls risk not currently captured on standardised tools, and (3) population specific causes of falls. The findings demonstrate that older adult mental health patients are a highly mobile group that experience frequent changes in cognition, behaviour and mental state. The mix of patients with organic or functional psychiatric disorders within the same environment also presents complex and unique care challenges and multi-disciplinary collaboration is central to reduce the risk of falls. As this group of patients are also frequently admitted to both general inpatient and aged care settings, the findings are relevant to the assessment and management of falls risk across all health care settings.

**PDF Endnote Y**

**The economic burden of injury: health care and productivity costs of injuries in the Netherlands**

Polinder S, Haagsma J, Panneman M, Scholten A, Brugmans M, van Beeck E.

*Accid. Anal. Prev.* 2016; 93: 92-100.

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**Abstract**

**BACKGROUND:** Detailed information on health care costs and productivity costs for the whole spectrum of injuries is lacking. We measured the total costs of injuries by external-cause, injury groupings, age and sex.

**METHOD:** Injury patients visiting an Emergency Department in the Netherlands were included. Health service use and work absenteeism were estimated with national database data and a prospective follow-up study. Health care costs (direct costs) and productivity costs (indirect costs) were determined using the incidence-based Dutch Cost of Injury Model.

**RESULTS:** Total costs of injuries were €3.5 billion annually (€210/capita and €4300/patient); €2.0 billion healthcare costs and €1.5 billion productivity costs. Home and leisure injury subcategory falls caused 41% of total costs. Traffic injury was prominent in the 15-54 age group, mainly due to bicycle injuries. Sports injuries, in special football/soccer injuries, resulted in high costs in the 15-24 age group. Although costs per patient were comparable between males and females, health care costs were higher in females, whereas males have more than twice as high productivity costs. Health care costs were highest for hip fractures (€20,000/patient). Extremity fractures had high costs due to high incidences and high productivity costs per patient.

**CONCLUSION:** Our detailed cost model identified known risk groups, such as elderly females with hip fractures resulting from falls, as well as less obvious important high risk groups, such as young children falling from furniture, young males who sustained football/soccer injuries and bicycle injuries among all ages. This information is essential to assess additional priority areas for prevention.

**PDF Y Endnote Y**

**The effects of a life goal-setting technique in a preventive care program for frail community-dwelling older people: a cluster nonrandomized controlled trial**

Yuri Y, Takabatake S, Nishikawa T, Oka M, Fujiwara T.

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**Affiliation:** Izumi Rehabilitation Home-Visit Nursing Care Station, Osaka, Japan.

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**DOI** 10.1186/s12877-016-0277-3 **PMID** 27175793 **PMCID** PMC4866031

**Abstract**

**BACKGROUND:** Frailty among older people is associated with an increased risk of needing care. There have been many reports on preventive care programs for frail older people, but few have shown positive effects on disability prevention. Physical exercise programs for frail older people affect elements such as physical fitness and balance, but are less effective for disability outcomes and are not followed up in the longer term. We developed a life goal-setting technique (LGST). Our objective was to determine the effect of a LGST plus standard preventive care program for community-dwelling frail older people.

**METHODS:** We used a cluster nonrandomized controlled trial with seven intervention and nine matched control groups, with baseline assessment and follow-up at 3, 6, and 9 months. Participants were 176 frail older people, aged 65 years or over, living in the community in Izumi, Osaka, Japan. All participants attended regular 120 min preventive care exercise classes each week, over 3 months. They also received oral care and nutrition education. The intervention groups alone received life goal-setting support. We assessed outcomes longitudinally, comparing pre-intervention with follow-up. The primary outcome measure was health improvement according to the Japanese Ministry of Health, Labour and Welfare's "Kihon Checklist" for assessment of frailty and quality of life (QOL), analyzed with a two-way ANOVA and post-test comparison. Secondary outcomes included physical functions and assessment of life goals.

**RESULTS:** The improvement on the Kihon Checklist for the intervention group was approximately 60 % from baseline to 9-months follow-up; the control group improved by approximately 40 %. The difference between groups was significant at 3-month ( $p = 0.043$ ) and 6-month ( $p = 0.015$ ) follow-ups but not at 9-month ( $p = 0.098$ ) follow-up. Analysis of QOL yielded a significant time  $\times$  group interaction effect ( $p = 0.022$ ). The effect was significant at 3 months in the intervention group, but at no time in the control group.

**CONCLUSION:** A 3-month exercise program helped to decrease frailty and improve QOL in frail older people, and the addition of LGST increased its effectiveness. The LGST is a feasible and promising intervention for reducing risk of needing care. **TRIAL REGISTRATION:** UMIN000021485. Registered 15 March 2016.

**PDF Y Endnote Y**

**The incidence and recurrence of getting lost in community-dwelling people with Alzheimer's disease: a two and a half-year follow-up**

Pai MC, Lee CC.

*PLoS One* 2016; 11(5): e0155480.

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(Copyright © 2016, Public Library of Science)

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## Abstract

Getting lost (GL) is a serious problem for people living with Alzheimer's disease (PwAD), causing psychological distress in both PwAD and caregivers, and increasing the odds of being institutionalized. It is thus important to identify risk factors for the GL events in PwAD. Between April 2009 and March 2012, we invited 185 community-dwelling PwAD and their caregivers to participate in this study. At the baseline, 95 had experienced GL (Group B); the remaining 90 (Group A) had not. We focused on the incidence of GL events and the associated factors by way of demographic data, cognitive function assessed by the Cognitive Ability Screening Instrument (CASI), and spatial navigation abilities as assessed by the Questionnaire of Everyday Navigational Ability (QuENA). After a 2.5-year period, the incidence of GL in Group A was 33.3% and the recurrence of GL in Group B was 40%. Multiple logistic regression analysis revealed that the inattention item on the QuENA and orientation item on the CASI had independent effects on the GL incidence, while the absence of a safety range was associated with the risk of GL recurrence. During the 2.5 years, the PwAD with GL incidence deteriorated more in the mental manipulation item on the CASI than those without. We suggest that before the occurrence of GL, the caregivers of PwAD should refer to the results of cognitive assessment and navigation ability evaluation to enhance the orientation and attention of the PwAD. Once GL occurs, the caregivers must set a safety range to prevent GL recurrence, especially for younger people.

## PDF Y Endnote Y

### Validity and reliability of a video questionnaire to assess physical function in older adults

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*Exp. Gerontol.* 2016; ePub(ePub): ePub.

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**DOI** 10.1016/j.exger.2016.04.022 **PMID** 27196360

## Abstract

**BACKGROUND:** Self-report questionnaires are widely used to assess physical function in older adults. However, they often lack a clear frame of reference and hence interpreting and rating task difficulty levels can be problematic for the responder. Consequently, the usefulness of traditional self-report questionnaires for assessing higher-level functioning is limited. Video-based questionnaires can overcome some of these limitations by offering a clear and objective visual reference for the performance level against which the subject is to compare his or her perceived capacity. Hence the purpose of the study was to develop and validate a novel, video-based questionnaire to assess physical function in older adults independently living in the community.

**METHODS:** A total of 61 community-living adults, 60years or older, were recruited. To examine validity, 35 of the subjects completed the video questionnaire, two types of physical performance tests: a test of instrumental activity of daily living (IADL) included in the Short Physical Functional Performance battery (PFP-10), and a composite of 3 performance tests (30s chair stand, single-leg balance and usual gait speed). To ascertain reliability, two-week test-retest reliability was assessed in the remaining 26 subjects who did not participate in validity testing.

**RESULTS:** The video questionnaire showed a moderate correlation with the IADLs (Spearman  $\rho=0.64$ ,  $p_{\leq 0.001}$ ; 95% CI (0.4, 0.8)), and a lower correlation with the composite score of

physical performance tests (Spearman  $\rho=0.49$ ,  $p < 0.01$ ; 95% CI (0.18, 0.7)). The test-retest assessment yielded an intra-class correlation (ICC) of 0.87 ( $p < 0.001$ ; 95% CI (0.70, 0.94)) and a Cronbach's alpha of 0.89 demonstrating good reliability and internal consistency.

**CONCLUSIONS:** Our results show that the video questionnaire developed to evaluate physical function in community-living older adults is a valid and reliable assessment tool; however, further validation is needed for definitive conclusions.

**PDF Y endnote Y**

### **Do quiet standing centre of pressure measures within specific frequencies differ based on ability to recover balance in individuals with stroke?**

Schinkel-Ivy A, Singer JC, Inness EL, Mansfield A. *Clin. Neurophysiol.* 2016; 127(6): 2463-2471.

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#### **Abstract**

**OBJECTIVE:** To determine whether quiet standing measures at specific frequency levels (representative of reactive control) differed between individuals with stroke based on their ability to recover balance (Failed or Successful Responses to external perturbations).

**METHODS:** Individuals with stroke completed a clinical assessment, including 30 s of quiet standing and lean-and-release postural perturbations, at admission to in-patient rehabilitation. Quiet standing centre of pressure (COP) signals were calculated and discrete wavelet decomposition was performed. Net COP amplitude, between-limb synchronization, and ratios of individual-limb COP were determined for each frequency level of interest, and for the non-decomposed signal (all frequency levels). Outcome measures were compared between individuals who exhibited Failed and Successful Responses during (a) unconstrained and (b) encouraged-use lean-and-release trials.

**RESULTS:** Individuals with Failed Responses during the unconstrained lean-and-release trials displayed greater net COP amplitude than those with Successful Responses, specifically within a frequency range of 0.40-3.20Hz.

**CONCLUSIONS:** Reduced ability to recover balance among individuals with stroke may be reflected in impaired reactive control of quiet standing. **SIGNIFICANCE:** These results provide insight into the mechanism by which reactive control of quiet standing is impaired in individuals with stroke, and may inform assessment and rehabilitation strategies for post-stroke reactive balance control.

**PDF Y Endnote Y**

### **Effects of insoles contact on static balance**

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*J. Phys. Ther. Sci.* 2016; 28(4): 1241-1244.

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(Copyright © 2016, Society of Physical Therapy Science)

**DOI** 10.1589/jpts.28.1241 **PMID** 27190460

### **Abstract**

**PURPOSE:** This study examined the effect of the degree of the contact area between the insoles and soles on static balance.

**SUBJECTS AND METHODS:** Thirteen healthy male and female adults voluntarily participated. All of the subjects wore three different types of insoles (no orthotic insole, partial contact, full contact) in the present experiment. The subjects were instructed to place both feet parallel to each other and maintain static balance for 30 seconds. Center of pressure parameters (range, total distance, and mean velocity) were analyzed.

**RESULTS:** The results show that the anteroposterior range and mediolateral (ML) total distance and velocity decreased when orthotic insoles with partial contact or full contact were used in comparison to when a flat insole (no orthotic insole) was used. Also, the ML range and total distance were lower with full contact than in the other two conditions. These results indicate that static balance improves as the degree of contact between the soles and insoles increases.

**CONCLUSION:** The results of this study suggests that using insoles with increased sole contact area would improve static balance ability.

**PDF Y Endnote Y**

### **Executive function and measures of fall risk among people with obesity**

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*Percept. Mot. Skills* 2016; ePub(ePub): ePub.

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**DOI** 10.1177/0031512516646158 **PMID** 27170627

### **Abstract**

This study investigated the relationship between obesity and executive function, and between executive function and fall risk (as estimated from select gait parameters). Of the 39 young adults (age =  $21.3 \pm 2.6$  years) recruited from the local university population via email announcement, 19 were in the obese group (based upon BMI and body fat percentage) and 20 were in the nonobese comparison group. Executive function was assessed using standardized tests including the Stroop test for selective attention; Trail Making test for divided attention, visuomotor tracking, and cognitive flexibility; the Verbal Fluency test for semantic memory; and the Digit-span test for working memory. Participants performed single- and dual-task walking (walking while talking) to evaluate fall risk during gait as measured by minimum toe clearance, required coefficient of friction, stance time, and stance-time variability. The obese group had lower scores for selective attention, semantic memory, and working memory. All participants had gait changes suggestive of a higher fall risk, for example, lower minimum toe clearance, longer stance time, and increased stance variability, during dual-task walking compared with single-task walking, and executive function scores (selective attention) were associated with gait (stance-time variability) during dual-task walking.

**RESULTS** indicate obesity was negatively associated with executive function among young adults and could increase fall risk.

**PDF Y Endnote Y**



### Exploring smartphone sensors for fall detection

Figueiredo IN, Leal C, Pinto L, Bolito J, Lemos A.

*mUX J. Mob. User Exp.* 2016; 5(1): 1-17.

(Copyright © 2016, Springer Science+Business Media)

**DOI** 10.1186/s13678-016-0004-1 **PMID** unavailable

#### Abstract

Falling, and the fear of falling, is a serious health problem among the elderly. It often results in physical and mental injuries that have the potential to severely reduce their mobility, independence and overall quality of life. Nevertheless, the consequences of a fall can be largely diminished by providing fast assistance. These facts have led to the development of several automatic fall detection systems. Recently, many researches have focused particularly on smartphone-based applications. In this paper, we study the capacity of smartphone built-in sensors to differentiate fall events from activities of daily living. We explore, in particular, the information provided by the accelerometer, magnetometer and gyroscope sensors. A collection of features is analyzed and the efficiency of different sensor output combinations is tested using experimental data. Based on these results, a new, simple, and reliable algorithm for fall detection is proposed. The proposed method is a threshold-based algorithm and is designed to require a low battery power consumption. The evaluation of the performance of the algorithm in collected data indicates 100 % for sensitivity and 93 % for specificity. Furthermore, evaluation conducted on a public dataset, for comparison with other existing smartphone-based fall detection algorithms, shows the high potential of the proposed method.

**PDF Y Endnote Y**

### Incidence of fall-related injuries in Iran: a population-based nationwide study

Saadat S, Hafezi-Nejad N, Ekhtiari YS, Rahimi-Movaghar A, Motevalian A, Amin-Esmaeili M, Sharifi V, Hajebi A, Radgoodarzi R, Hefazi M, Eslami V, Karimi H, Mohammad K, Rahimi-Movaghar V.

*Injury* 2016; ePub(ePub): ePub.

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(Copyright © 2016, Elsevier Publishing)

**DOI** 10.1016/j.injury.2016.05.001 **PMID** 27184519

#### Abstract

**BACKGROUND:** Fall-related injuries are considered to be a leading cause of morbidity and disability worldwide. The aim of this study was to investigate the incidence of fall-related injuries and its determinants in Iran.

**METHODS:** A cross-sectional household survey of a representative sample of 15-64 years old Iranians was carried out in 2011. A three-stage cluster sampling design was used. Total of 1525 clusters were randomly selected. Six households in each cluster were randomly selected, and one member of each household was interviewed. Data on the demographics and history of fall-related injury were obtained using the previously validated and reliability tested Short Form Injury Questionnaire 7 (SFIQ7). In all, 7886 subjects responded to the survey.

**RESULTS:** The incidence rate of all fall-related injuries was 59 (95%CI: 45-72) per 1000 person-year. The incidence rate of First Aid Fall-Related Injuries (FAFRIs) and Medical Attended Fall-Related Injuries (MAFRIs) were 30±5 and 28±12, respectively. Homes were the most common place of falls (52.5%). For all and MAFRIs, the most common activity leading to fall injury was walking (37.8% and

47.6%, respectively) whereas for FAFRIs was playing (31.9%). For all and FAFRIs, the most common description was as follows: upper limb as the injured organ (52.0% and 61.2%, respectively) and superficial wound as the most prevalent type of injury (39.0% and 61.8%, respectively). However, for MAFRIs, lower limb injuries (52.9%) and fracture (43.6%) were more pronounced. Risk factors for MAFRI were as follows: paid work activity (OR: 3.11; 95%CI: 2.07-4.67), playing (OR: 14.64; 95%CI: 6.34-33.80), walking (OR: 57.09; 95%CI: 28.95-112.59), driving (OR: 2.86; 95%CI: 1.23-6.63), and recreation activities (OR: 44.11; 95%CI: 14.04-138.54). Higher age and education were the other risk factors for MAFRI, as well as residing in rural areas.

**CONCLUSION:** This study revealed considerable incidence of fall injuries in Iranian population especially in rural regions who need access to protective equipment. People need to be warned about the constant risk of fall even during non-avoidable activities such as walking, playing, driving and paid/unpaid working especially in older ages. Implementation of fall prevention measures, home and behavioural modifications are recommended.

**PDF Y Endnote Y**

**Influence of affective auditory stimuli on balance control during static stance**

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Ergonomics 2016; ePub(ePub): ePub.

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**DOI** 10.1080/00140139.2016.1182649 **PMID** 27189517

**Abstract**

The main purpose of this study was to examine the effects of affective auditory stimuli on balance control during static stance. Twelve female and 12 male participants were recruited. Each participant completed four upright standing trials including three auditory stimuli trials and one baseline trial (ie no auditory stimuli). The three auditory stimuli trials corresponded to the pleasant, neutral and unpleasant sound conditions. Center of pressure (COP) measures were used to quantify balance control performance. It was found that unpleasant auditory stimuli were associated with larger COP amplitude in the AP direction compared to the rest testing conditions. There were no significant interaction effects between 'auditory stimuli' and gender. These findings suggested that some specificities presented by auditory stimuli are important for balance control, and the effects of auditory stimuli on balance control were dependent on their affective components. Practitioner Summary: Findings from this study can aid in better understanding of the relationship between auditory stimuli and balance control. In particular, unpleasant auditory stimuli were found to result in poorer balance control and higher fall risks. Therefore, to prevent fall accidents, interventions should be developed to reduce exposures to unpleasant sound.

**PDF Y Endnote Y**

**Negotiating identity and self-image: perceptions of falls in ambulatory individuals with spinal cord injury - a qualitative study**

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*Clin. Rehabil.* 2016; ePub(ePub): ePub.

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### Abstract

**OBJECTIVE:** Explore and describe experiences and perceptions of falls, risk of falling, and fall-related consequences in individuals with incomplete spinal cord injury (SCI) who are still walking.

**DESIGN:** A qualitative interview study applying interpretive content analysis with an inductive approach. **SETTING:** Specialized rehabilitation hospital. **SUBJECTS:** A purposeful sample of 15 individuals (10 men), 23 to 78 years old, 2-34 years post injury with chronic incomplete traumatic SCI, and walking  $\geq 75\%$  of time for mobility needs.

**METHODS:** Individual, semi-structured face-to-face interviews were recorded, condensed, and coded to find themes and subthemes.

**RESULTS:** One overarching theme was revealed: "Falling challenges identity and self-image as normal" which comprised two main themes "Walking with incomplete SCI involves minimizing fall risk and fall-related concerns without compromising identity as normal" and "Walking with incomplete SCI implies willingness to increase fall risk in order to maintain identity as normal". Informants were aware of their increased fall risk and took precautions, but willingly exposed themselves to risky situations when important to self-identity. All informants expressed some conditional fall-related concerns, and a few experienced concerns limiting activity and participation.

**CONCLUSION:** Ambulatory individuals with incomplete SCI considered falls to be a part of life. However, falls interfered with the informants' identities and self-images as normal, healthy, and well-functioning. A few expressed dysfunctional concerns about falling, and interventions should target these.

PDF Y Endnote Y

### One-leg standing time of the affected side moderately predicts for postdischarge falls in community stroke patients

Yoshimoto Y, Oyama Y, Tanaka M, Sakamoto A.

*J. Stroke Cerebrovasc. Dis.* 2016; ePub(ePub): ePub.

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DOI 10.1016/j.jstrokecerebrovasdis.2016.03.032 PMID 27177919

### Abstract

**BACKGROUND:** The purpose of the present study was to investigate the predictive accuracy of one-leg standing time at hospital discharge on falls in stroke patients.

**METHODS:** This was a retrospective cohort study. Participants included stroke patients (n = 65) who could walk when discharged from inpatient rehabilitation ward. To investigate the relationship between one-leg standing time and falls, logistic analysis was utilized with a criterion variable including the presence or absence of falls after 1-year hospital discharge as well as explanatory variables including Brunnstrom stage, knee extension strength on the affected side, Barthel Index, 10-m walking speed, and one-leg standing time on both sides. The accuracy of prediction by one-leg standing time was measured by the area under the curve of the receiver operating characteristic curve.

**RESULTS:** Among the 65 patients, 38 (58.5%) experienced a fall 1 year after discharge. One-leg standing time of the affected side was not significantly associated with the falls (odds ratio:.89; 95%

confidence interval:.79-1.01). When the fall incidents were assessed by area under the curve of the receiver operating characteristic curve, one-leg standing time of the affected side was observed to have increased marginally to.93 (95% confidence interval:.87-.99) as compared to the traditional prediction mode area under the curve (area under the curve.88; 95% confidence interval:.81-.97).

**CONCLUSIONS:** One-leg standing time of the affected side may be considered as a moderately effective and simple assessment method for predicting postdischarge falls in a clinical setting.

**PDF Y Endnote Y**

### **Poor vision and self-reported functional difficulties among recently hospitalized individuals in the United States**

Willis J, Ramulu PY.

*Ophthalmic. Epidemiol.* 2016; 23(3): 154-161.

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**DOI** 10.3109/09286586.2016.1155717 **PMID** 27159428

#### **Abstract**

**PURPOSE:** Many hospitalized adults may have limited vision and as a result be at increased risk of worse functional outcomes. Here, we determine the prevalence of poor vision among recently hospitalized United States adults. Additionally, we evaluate the impact of objective vision defects on reading difficulty and external mobility outcomes (difficulty with falls and going down steps).

**METHODS:** Our cross-sectional study included 1,347 adult Americans aged 50 years and older, all recently hospitalized, participating in the 2001-2008 National Health and Nutrition Examination Survey (NHANES). Self-reported difficulty with reading and going down steps/stairs/curbs data were collected for all participants, while data on self-reported falling difficulty were only available for the 2001-2004 NHANES (n=631). Presenting near and distance visual acuity (VA) were measured, with poor vision defined as VA worse than 20/40.

**RESULTS:** Poor near and distance vision were present in 17.4% and 9.8% of individuals, respectively. Multivariable analyses showed that the odds of reading difficulty were greater with worse VA (odds ratio, OR, 1.9 per 0.3 logMAR increment in near VA, 95% confidence interval, CI, 1.6-2.4, P<0.01), as were the odds of difficulty going down steps/stairs/curbs (OR 2.4 per 0.3 logMAR increment in distance VA, 95% CI 1.9-3.1, P<0.01) and odds of falling difficulty (OR 1.6 per 0.3 logMAR increment in distance VA, 95% CI 1.1-2.4, P=0.04).

**CONCLUSION:** About 1 in 10 and 1 in 6 recently hospitalized older Americans had poor distance and near vision, respectively. Many of these individuals may experience trouble reading hospital documents and ambulating, and may be at increased risk of falls.

**PDF Y Endnote Y**

### **The effect of virtual reality training on balance and gait ability in patients with stroke: a systematic review and meta-analysis**

de Rooij IJ, van de Port IG, Meijer JG.

*Phys. Ther.* 2016; ePub(ePub): ePub.

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(Copyright © 2016, American Physical Therapy Association)

**DOI** 10.2522/ptj.20160054 **PMID** 27174255

## Abstract

**BACKGROUND:** Virtual reality (VR) training is considered as a promising novel therapy for balance and gait recovery in patients with stroke.

**PURPOSE:** The aim of this study was to conduct a systematic literature review with meta-analysis to investigate whether balance or gait training using VR is more effective than conventional balance or gait training in patients with stroke. **DATA SOURCES:** Literature search was carried out in the databases PubMed, Embase, Medline and Cochrane Library up to December 1st, 2015. **STUDY SELECTION:** Randomized controlled trials that compared the effect of balance or gait training with and without VR on balance and gait ability in patients with stroke were included. **DATA EXTRACTION AND SYNTHESIS:** Twenty-one studies with median PEDro score of 6.0 were included. The included studies demonstrated a significant greater effect of VR training on balance and gait recovery after stroke compared to conventional therapy as indicated with the most frequently used measures: gait speed, Berg Balance Scale and Timed Up and Go. VR was more effective to train gait and balance than conventional training when VR interventions were added to conventional therapy as well as when time dose was matched.

**LIMITATIONS:** The presence of publication bias and diversity in included studies.

**CONCLUSIONS:** The results suggested that VR training is more effective than balance or gait training without VR for improving balance or gait ability in patients with stroke. Future studies are recommended to investigate the effect of VR on participation level with an adequate follow-up period. Overall, a positive and promising effect of VR training on balance and gait ability is expected.

## PDF Y Endnote Y

### The impact of mild cognitive impairment on gait and balance: a systematic review and meta-analysis of studies using instrumented assessment

Bahureksa L, Najafi B, Saleh A, Sabbagh M, Coon D, Mohler MJ, Schwenk M.  
*Gerontology* 2016; ePub(ePub): ePub.

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**DOI** 10.1159/000445831 **PMID** 27172932

## Abstract

**BACKGROUND:** In addition to cognitive deficits, people with mild cognitive impairment (MCI) can experience motor dysfunction, including deficits in gait and balance. Instrumented motor performance assessment may allow the detection of subtle MCI-related motor deficits, allowing early diagnosis and intervention. Motor assessment under dual-task conditions may increase diagnostic accuracy; however, the sensitivity of different cognitive tasks is unclear.

**OBJECTIVE:** To systematically review the extant literature focusing on instrumented assessment of gait and balance parameters for discriminating MCI patients from cognitively intact peers.

**METHODS:** Database searches were conducted in PubMed, EMBASE, Cochrane Library, PsycINFO and Web of Science. Inclusion criteria were: (1) clinically confirmed MCI; (2) instrumented measurement of gait and/or balance; (3) English language, and (4) reporting gait or balance parameters which could be included in a meta-analysis for discriminating between MCI patients and cognitively intact individuals based on weighted effect size (d).

**RESULTS:** Fourteen studies met the inclusion criteria and reported quantitative gait (n = 11) or postural balance (n = 4) parameters to be included in the meta-analysis. The meta-analysis revealed

that several gait parameters including velocity ( $d = -0.74$ ,  $p < 0.01$ ), stride length ( $d = -0.65$ ,  $p < 0.01$ ), and stride time (mean:  $d = 0.56$ ,  $p = 0.02$ ; coefficient of variation:  $d = 0.50$ ,  $p < 0.01$ ) discriminated best between MCI and healthy controls under single-task conditions. Importantly, dual-task assessment increased the discriminative power of gait variables wherein gait variables with counting tasks appeared to be more sensitive (range  $d = 0.84$ - $1.35$ ) compared to verbal fluency tasks such as animal naming (range  $d = 0.65$ - $0.94$ ). Balance parameters identified as significant discriminators were anterior-posterior ( $d = 0.49$ ,  $p < 0.01$ ) and mediolateral ( $d = -0.34$ ,  $p = 0.04$ ) sway position in the eyes-open condition but not eyes-closed condition.

**CONCLUSION:** Existing studies provide evidence that MCI affects specific gait parameters. MCI-related gait changes were most pronounced when subjects are challenged cognitively (i.e., dual task), suggesting that gait assessment with an additional cognitive task is useful for diagnosis and outcome analysis in the target population. Static balance seems to also be affected by MCI, although limited evidence exists. Instrumented motor assessment could provide a critical opportunity for MCI diagnosis and tailored intervention targeting specific deficits and potentially slowing progression to dementia. Further studies are required to confirm our findings.

**PDF Y Endnote Y**