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'My independent streak may get in the way': how older adults respond to falls prevention education in hospital

Hill AM, Francis-Coad J, Haines TP, Waldron N, Etherton-Beer C, Flicker L, Ingram K, McPhail SM. BMJ Open 2016; 6(7): e012363.

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DOI 10.1136/bmjopen-2016-012363 **PMID** 27466244

Abstract

OBJECTIVES: The aim of the study was to determine how providing individualised falls prevention education facilitated behaviour change from the perspective of older hospital patients on rehabilitation wards and what barriers they identified to engaging in preventive strategies.

DESIGN: A prospective qualitative survey.

METHODS: Older patients (n=757) who were eligible (mini-mental state examination score>23/30) received falls prevention education while admitted to eight rehabilitation hospital wards in Western Australia. Subsequently, 610 participants were surveyed using a semistructured questionnaire to gain their response to the in-hospital education and their identified barriers to engaging in falls prevention strategies. Deductive content analysis was used to map responses against conceptual frameworks of health behaviour change and risk taking.

RESULTS: Participants who responded (n=473) stated that the education raised their awareness, knowledge and confidence to actively engage in falls prevention strategies, such as asking for assistance prior to mobilising. Participants' thoughts and feelings about their recovery were the main barriers they identified to engaging in safe strategies, including feeling overconfident or desiring to be independent and thinking that staff would be delayed in providing assistance. The most common task identified as potentially leading to risk-taking behaviour was needing to use the toilet.

CONCLUSIONS: Individualised education assists older hospital rehabilitation patients with good levels of cognition to engage in suitable falls prevention strategies while on the ward. Staff should engage with patients to understand their perceptions about their recovery and support patients to take an active role in planning their rehabilitation.

PDF Y Endnote Y

A novel exercise initiative for seniors to improve balance and physical function

Sales M, Polman R, Hill KD, Levinger P.

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

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DOI 10.1177/0898264316662359 **PMID** 27511957

Abstract

OBJECTIVE: To investigate the feasibility, effectiveness, and short-term effects of an exercise intervention using a novel exercise park in improving seniors' balance, physical function, and quality of life.

METHOD: Randomized controlled trial with pre- and post-intervention design (baseline and 18-week intervention) was used. Outcome measures included measures of balance, strength, and function, as well as quality of life and fear of falling. MANCOVA was used to assess differences between groups (control and exercise intervention) over time.

RESULTS: Intervention group showed significant improvement on single leg stance (p =.02, 95% confidence interval [CI] = [-8.35, -0.549]), knee strength (p <.01, 95% CI = [-29.14, -5.86]), 2-min walk

(p = 0.02, 95% CI = [-19.13, -0.859]), and timed sit to stand (p =.03, 95% CI = [-2.26, -0.143]) tests.
DISCUSSION: The exercise park program improved physical function and had high adherence and participation rate. Such intervention has been shown to be safe and therefore might enhance participation in exercise programs for older adults.

PDF Y Endnote Y

A smartphone-based architecture to detect and quantify freezing of gait in Parkinson's disease
Capecci M, Pepa L, Verdini F, Ceravolo MG.
Gait Posture 2016; 50: 28-33.
Affiliation: Department of Experimental and Clinical Medicine, Neurorehabilitation Clinic, "Politecnica delle Marche" University, Ancona, AN, Italy.

DOI 10.1016/j.gaitpost.2016.08.018 **PMID** 27567449
Abstract
INTRODUCTION: The freezing of gait (FOG) is a common and highly distressing motor symptom in patients with Parkinson's Disease (PD). Effective management of FOG is difficult given its episodic nature, heterogeneous manifestation and limited responsiveness to drug treatment.
METHODS: In order to verify the acceptance of a smartphone-based architecture and its reliability at detecting FOG in real-time, we studied 20 patients suffering from PD-related FOG. They were asked to perform video-recorded Timed Up and Go (TUG) test with and without dual-tasks while wearing the smartphone. Video and accelerometer recordings were synchronized in order to assess the reliability of the FOG detection system as compared to the judgement of the clinicians assessing the videos. The architecture uses two different algorithms, one applying the Freezing and Energy Index (Moore-Bächlin Algorithm), and the other adding information about step cadence, to algorithm 1.
RESULTS: A total 98 FOG events were recognized by clinicians based on video recordings, while only 7 FOG events were missed by the application. Sensitivity and specificity were 70.1% and 84.1%, respectively, for the Moore-Bächlin Algorithm, rising to 87.57% and 94.97%, respectively, for algorithm 2 (McNemar value=28.42; p=0.0073).
CONCLUSION: Results confirm previous data on the reliability of Moore-Bächlin Algorithm, while indicating that the evolution of this architecture can identify FOG episodes with higher sensitivity and specificity. An acceptable, reliable and easy-to-implement FOG detection system can support a better quantification of the phenomenon and hence provide data useful to ascertain the efficacy of therapeutic approaches.

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Effectiveness of non-pharmacological interventions to prevent falls in older people: a systematic overview. The SENATOR Project ONTOP Series
Rimland JM, Abraha I, Dell'Aquila G, Cruz-Jentoft A, Soiza R, Gudmusson A, Petrovic M, O'Mahony D, Todd C, Cherubini A.
PLoS One 2016; 11(8): e0161579.
Affiliation: Geriatrics and Geriatric Emergency Care, Italian National Research Center on Aging, Ancona, Italy.

DOI 10.1371/journal.pone.0161579 **PMID** 27559744
Abstract
BACKGROUND: Falls are common events in older people, which cause considerable morbidity and mortality. Non-pharmacological interventions are an important approach to prevent falls. There are a large number of systematic reviews of non-pharmacological interventions, whose evidence needs to be synthesized in order to facilitate evidence-based clinical decision making.

OBJECTIVES: To systematically examine reviews and meta-analyses that evaluated non-pharmacological interventions to prevent falls in older adults in the community, care facilities and hospitals.
METHODS: We searched the electronic databases Pubmed, the Cochrane Database of Systematic Reviews, EMBASE, CINAHL, PsycINFO, PEDRO and TRIP from January 2009 to March 2015, for systematic reviews that included at least one comparative study, evaluating any non-pharmacological intervention, to prevent falls amongst older adults. The quality of the reviews was assessed using AMSTAR and ProFaNE taxonomy was used to organize the interventions.
RESULTS: Fifty-nine systematic reviews were identified which consisted of single, multiple and multifactorial non-pharmacological interventions to prevent falls in older people. The most frequent ProFaNE defined interventions were exercises either alone or combined with other interventions, followed by environment/assistive technology interventions comprising environmental modifications, assistive and protective aids, staff education and vision assessment/correction. Knowledge was the third principle class of interventions as patient education. Exercise and multifactorial interventions were the most effective treatments to reduce falls in older adults, although not all types of exercise were equally effective in all subjects and in all settings. Effective exercise programs combined balance and strength training. Reviews with a higher AMSTAR score were more likely to contain more primary studies, to be updated and to perform meta-analysis.
CONCLUSIONS: The aim of this overview of reviews of non-pharmacological interventions to prevent falls in older people in different settings, is to support clinicians and other healthcare workers with clinical decision-making by providing a comprehensive perspective of findings.
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Factors related to gait and balance deficits in older adults
Al-Momani M, Al-Momani F, Alghadir AH, Alharethy S, Gabr SA.
Clin. Interv. Aging 2016; 11: 1043-1049.
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DOI 10.2147/CIA.S112282 **PMID** 27570449
Abstract
PURPOSE: The aim of this study was to investigate the effects of physical, mental, and cognitive disabilities on gait and balance deficits among nursing home residents with different diseases in Jordan and also to find the risk of fall associated with or without these diseases.
METHODS: A sample of 221 nursing home residents aged 18-100 years in Jordan was recruited for this study. All participants were assessed using the Arabic versions of the Tinetti assessment battery (TAB) for gait and balance, mini-mental state examination, and disability of arm, shoulder, and hand assessment test.
RESULTS: A total of 221 nursing home residents were included in this study. Different chronic diseases were medically reported in this study. Psychiatric disorders (45.7%) were shown to be the most prevalent disease seen among the participants, followed by hypertension and diabetes mellitus affecting 33.5% and 23.5% of the participants, respectively. However, the least prevalent diseases were stroke (17.2%), joint inflammation (17.2%), and arthritis (9.0%). Based on TAB scores, the participants were classified into three groups: high risk of falls (≤18; n=116), moderate risk of falls (19-23; n=25), and low risk of falls (≥24; n=80). The correlation between physical activity and mental health problems with risks of falls was reported in all participants. The data showed that participants with over 50% upper extremity disability, stroke, heart disease, arthritis, joint diseases, diabetes, and hypertension recorded higher risks of falls as measured by TAB test compared to those with low and moderate TAB scores. Also, impairment in cognitive abilities and psychiatric disorders was shown to

be associated with gait and balance problems, with a higher risk of falls in 47.5% and 46.1% of the residents, respectively.
CONCLUSION: This study revealed a significant impact of upper limb disability, stroke, heart disease, arthritis, joint diseases, diabetes, and hypertension as well as psychiatric disorders and cognitive disabilities on gait and balance deficits among home-resident older adults.
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Hip fractures in the elderly: the role of cortical bone
Tarantino U, Rao C, Tempesta V, Gasbarra E, Feola M.
Injury 2016; ePub(ePub): ePub.
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DOI 10.1016/j.injury.2016.07.058 **PMID** 27558243
Abstract
INTRODUCTION: Osteoporosis is characterised by poor bone quality arising from alterations to trabecular bone. However, recent studies have also described an important role of alterations to cortical bone in the physiopathology of osteoporosis. Although dual-energy X-ray absorptiometry (DXA) is a valid method to assess bone mineral density (BMD), real bone fragility in the presence of comorbidities cannot be evaluated with this method. The aim of this study was to evaluate if cortical thickness could be a good parameter to detect bone fragility in patients with hip fracture, independent of BMD.
METHODS: A retrospective study was conducted on 100 patients with hip fragility fractures. Cortical index was calculated on fractured femur (femoral cortical index [FCI]) and, when possible, on proximal humerus (humeral cortical index [HCI]). All patients underwent densitometric evaluation by DXA.
RESULTS: Average value of FCI was 0.43 and of HCI was 0.25. Low values of FCI were found in 21 patients with normal or osteopenic values of BMD, while low values of HCI were found in three patients with non-osteoporotic values of BMD.
DISCUSSION AND CONCLUSION: Cortical thinning measured from X-Ray of the femur identifies 21% additional fracture cases over that identified by a T-score <-2.5 (57%). FCI could be a useful tool to evaluate bone fragility and to predict fracture risk even in patients with normal and osteopenic BMD.

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Investigating the effect of education based on need to prevent falling during activities of daily living among the elderlies referring to health centers of Isfahan
Ghasemi M, RezaeiDehaghani A, Mehrabi T.
Iran. J. Nurs. Midwifery Res. 2016; 21(4): 430-435.
Affiliation: Nursing and Midwifery Care Research Center, Faculty of Nursing and Midwifery, Isfahan University of Medical Sciences, Isfahan, Iran.

DOI 10.4103/1735-9066.185599 **PMID** 27563329
Abstract
BACKGROUND: Falling has a great importance among the elderlies. Even if no physical injury occurs, it can cause fear of falling down again and, consequently, reduce older adults' activities. With regard to the prevalence of falling among older adults, its prevention is essential. Therefore, the present study was aimed to define the effect of need-based education on prevention of older adults' falling during their everyday life activities.
MATERIALS AND METHODS: This is a quasi-experimental study. Study population comprised all the

older adults of age 60 years and over referring to health care centers in Isfahan. Through multiple random sampling, 15 older adults were selected from four health care centers. Data collection tool in the present study was Daily Activity Questionnaire.
RESULTS: Results showed a significant difference between the mean of daily activity scores in the intervention group before, immediately after, and 1 month after the intervention (12, 13.6, and 13.5, respectively; P = 0.01). Meanwhile, there was no significant deference between the scores immediately after and 1 month after the intervention. There was no significant difference observed between the three time points in the control group (mean = 12.3; P = 0.907).
CONCLUSION: Implementation of education concerning prevention of older adults' falling led to improvement of their daily activity in the intervention group.
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Managing the mantainment of gait stability during dual walking task: effects of age and neurological disorders
Tramontano M, Morone G, Curcio A, Temperoni G, Medici A, Morelli D, Caltagirone C, Paolucci S, Iosa M.
Eur. J. Phys. Rehabil. Med. 2016; ePub(ePub): ePub.
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DOI unavailable **PMID** 27575014
Abstract
BACKGROUND: Dual task paradigm is common mechanism of daily life, it is often used for investigating the effect on cognitive processing of motor behavior.
AIM: In the present study we investigate the dual task interference during walking on upright gait stability.
DESIGN: cross-sectional study.
SETTING: Inpatient neurorehabilitation unit and children neurorehabilitation unit. POPULATION: Eighty-five subjects were enrolled, divided into five groups: healthy young, healthy elderly, children with typical development, children with cerebral palsy and adults with stroke in subacute phase.
METHODS: All subjects had to walk through a pathway during which they had to hear a sound, turn the head to watch a number and verbalize it. Subjects wore an accelerometer on their lumbar spine to measure upright gait stability have been assessed by means of the Root Mean Square (RMS) of the trunk acceleration.
RESULTS: All subjects showed a reduced speed when performing a dual task with respect to single task. This reduction was significantly different among groups ($F(4,81)=12.253$, $p<0.001$, ES=0.377). The RMS resulted increased along LL-axis, and reduced along AP- and CC-axes during the dual task walking.
CONCLUSION: These accelerations were significantly related to the changes in speed that were managed in a different way in subjects affected by cerebral palsy and stroke. CLINICAL REHABILITATION IMPACT: The information obtained in this study may be used to support specific rehabilitation techniques in subjects with poor balance ability.
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Near falls predict substantial falls in older adults: a prospective cohort study
Nagai K, Yamada M, Komatsu M, Tamaki A, Kanai M, Miyamoto T, Tsukagoshi R, Tsuboyama T.
Geriatr. Gerontol. Int. 2016; ePub(ePub): ePub.
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DOI 10.1111/ggi.12898 **PMID** 27577092

Abstract
AIM: Little is known about the relationship between near falls and substantial falls in older adults. Clarifying this relationship would be helpful to assess fall risk in greater detail. The purpose of the present study was to clarify whether near falls predict future falls.
METHODS: This was designed to be a prospective cohort study. Participants were recruited from a community apartment for older adults. After a baseline physical assessment, participants were asked to record the incidence of near falls in a diary for 3 months. After the survey period, participants were followed for 6 months by telephone contact every 2 months. Cox proportional hazards regression models were used to analyze the association between near falls and falls.
RESULTS: A total of 60 participants were included in the analysis. During the initial 3 months, 23 participants (38%) experienced near falls. Eight participants (13%) experienced substantial falls during the following 6 months. Cox proportional hazards regression models adjusted for age, body mass index, sex and physical frailty showed that experience of near falls (hazards regression 6.0, 95% confidence intervals 1.1-31.7; $P < 0.05$) was significantly associated with incidence of future falls.
CONCLUSIONS: Experience of near falls among older adults is an independent predictor of substantial falls irrespective of the physical frailty status. Clinicians might need to focus on near falls to appropriately assess the fall risk in older adults.

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Older people, assistive technologies, and the barriers to adoption: A systematic review
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Int. J. Med. Inform. 2016; 94: 112-116.
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DOI 10.1016/j.ijmedinf.2016.07.004 **PMID** 27573318
Abstract
BACKGROUND: Older people generally prefer to continue living in their own homes rather than move into residential age care institutions. Assistive technologies and sensors in the home environment and/or bodily worn systems that monitor people's movement might contribute to an increased sense of safety and security at home. However, their use can raise ethical anxieties as little is known about how older persons perceive assistive and monitoring technologies.
OBJECTIVES: To review the main barriers to the adoption of assistive technologies (ATs) by older adults in order to uncover issues of concern from empirical studies and to arrange these issues from the most critical to the least critical.
METHOD: A 4-step systematic review was conducted using empirical studies: locating and identifying relevant articles; screening of located articles; examination of full text articles for inclusion/exclusion; and detail examination of the 44 articles included.
RESULTS: Privacy is a top critical concern to older adults, registering a 34% of the total articles examined. Two other equally potent barriers to the adoption of ATs were trust and functionality/added value representing 27 and 25 per cent each respectively of the total studies examined. Also of serious concerns are cost of ATs and ease of use and suitability for daily use (23%) each respectively, perception of "no need" (20%), stigma (18%), and fear of dependence and lack of training (16%) each respectively. These underlying factors are generation/cohort effects and physical decline relating to aging, and negative attitudes toward technologies such as the so-called "gerontechnologies" specifically targeting older adults. However, more and more older adults adopt different kinds of ATs in order to fit in with the society.
CONCLUSIONS: The identified underlying factors are generation/cohort effects and physical decline relating to aging, and negative attitudes toward technologies. The negative attitudes that are most frequently associated with technologies such as the so-called "gerontechnologies" specifically

targeting older adults contain stigmatizing symbolism that might prevent them from adopting them.

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Relationship between fear of falling and functional status in nursing home residents aged older than 65 years

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Geriatr. Gerontol. Int. 2016; ePub(ePub): ePub.
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DOI 10.1111/ggi.12897 **PMID** 27576941
Abstract
AIM: The present study investigated the relationship between fear of falling and functional status, and sociodemographic and health-related factors in nursing home residents aged older than 65 years.
METHODS: The cross-sectional study involved 100 participants who were residents of a nursing home and aged older than 65 years. Fear of falling was assessed using the Falls Efficacy Scale. Functional status was assessed by four performance-based measures. Balance was assessed by the Berg Balance Scale, mobility by the Timed Up and Go test, lower limbs muscle strength by the Chair Rising Test and participants' functional ability by the motor Functional Independence Measure.
RESULTS: There was a significant negative correlation between the Falls Efficacy Scale and Berg Balance Scale ($P < 0.001$), and motor Functional Independence Measure ($P < 0.001$) scores; and a positive correlation with the Timed Up and Go test ($P < 0.001$) and Chair Rising Test ($P < 0.001$) values. Falls Efficacy Scale score increase is associated with age, being a widower/widow and the number of falls in the previous year. Higher fear of falling is associated with an increase in the number of falls in the previous year and with a decrease in Berg Balance Scale score.
CONCLUSIONS: The study found a significant associations between Falls Efficacy Scale score and all of the examined parameters of functional status, the number of falls in the previous year, age and marital status of widower/widow. The major finding was that poor balance and an increase in the number of falls in the previous year are independent factors significantly associated with the fear of falling.

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Sensorimotor and cognitive predictors of impaired gait adaptability in older people

Caetano MJ, Menant JC, Schoene D, Pelicioni PH, Sturnieks DL, Lord SR.
J. Gerontol. A Biol. Sci. Med. Sci. 2016; ePub(ePub): ePub.
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DOI 10.1093/gerona/glw171 **PMID** 27573810
Abstract
BACKGROUND: The ability to adapt gait when negotiating unexpected hazards is crucial to maintain stability and avoid falling. This study investigated whether impaired gait adaptability in a task including obstacle and stepping targets is associated with cognitive and sensorimotor capacities in older adults.
METHODS: Fifty healthy older adults (74±7 years) were instructed to either (a) avoid an obstacle at usual step distance or (b) step onto a target at either a short or long step distance projected on a walkway two heel strikes ahead and then continue walking. Participants also completed cognitive and sensorimotor function assessments.

RESULTS: Stroop test and reaction time performance significantly discriminated between participants who did and did not make stepping errors, and poorer Trail-Making test performance predicted shorter penultimate step length in the obstacle avoidance condition. Slower reaction time predicted poorer stepping accuracy; increased postural sway, weaker quadriceps strength, and poorer Stroop and Trail-Making test performances predicted increased number of steps taken to approach the target/obstacle and shorter step length; and increased postural sway and higher concern about falling predicted slower step velocity.
CONCLUSIONS: Superior executive function, fast processing speed, and good muscle strength and balance were all associated with successful gait adaptability. Processing speed appears particularly important for precise foot placements; cognitive capacity for step length adjustments; and early and/or additional cognitive processing involving the inhibition of a stepping pattern for obstacle avoidance. This information may facilitate fall risk assessments and fall prevention strategies.

PDF Y Endnote Y

Social dancing and incidence of falls in older adults: a cluster randomised controlled trial
Merom D, Mathieu E, Cerin E, Morton RL, Simpson JM, Rissel C, Anstey KJ, Sherrington C, Lord SR, Cumming RG. PLoS Med. 2016; 13(8): e1002112.
Affiliation: Sydney School of Public Health, University of Sydney, Sydney, Australia.

DOI 10.1371/journal.pmed.1002112 **PMID** 27575534
Abstract
BACKGROUND: The prevention of falls among older people is a major public health challenge. Exercises that challenge balance are recognized as an efficacious fall prevention strategy. Given that small-scale trials have indicated that diverse dance styles can improve balance and gait of older adults, two of the strongest risk factors for falls in older people, this study aimed to determine whether social dance is effective in i) reducing the number of falls and ii) improving physical and cognitive fall-related risk factors.
METHODS AND FINDINGS: A parallel two-arm cluster randomized controlled trial was undertaken in 23 self-care retirement villages (clusters) around Sydney, Australia. Eligible villages had to have an appropriate hall for dancing, house at least 60 residents, and not be currently offering dance as a village activity. Retirement villages were randomised using a computer generated randomisation method, constrained using minimisation. Eligible participants had to be a resident of the village, be able to walk at least 50 m, and agree to undergo physical and cognitive testing without cognitive impairment. Residents of intervention villages (12 clusters) were offered twice weekly one-hour social dancing classes (folk or ballroom dancing) over 12 mo (80 h in total). Programs were standardized across villages and were delivered by eight dance teachers. Participants in the control villages (11 clusters) were advised to continue with their regular activities.
MAIN OUTCOMES: falls during the 12 mo trial and Trail Making Tests.
SECONDARY OUTCOMES: The Physiological Performance Assessment (i.e., postural sway, proprioception, reaction time, leg strength) and the Short Physical Performance Battery; health-related physical and mental quality of life from the Short-Form 12 (SF-12) Survey. Data on falls were obtained from 522 of 530 (98%) randomised participants (mean age 78 y, 85% women) and 424 (80%) attended the 12-mo reassessment, which was lower among folk dance participants (71%) than ballroom dancing (82%) or control participants (82%, p = 0.04). Mean attendance at dance classes was 51%. During the period, 444 falls were recorded; there was no significant difference in fall rates between the control group (0.80 per person-year) and the dance group (1.03 per person-year). Using negative binomial regression with robust standard errors the adjusted Incidence Rate Ratio (IRR) was 1.19 (95% CI: 95% CI = 0.83, 1.71). In exploratory post hoc subgroup analysis, the rate of falls was higher among dance participants with a history of multiple falls (IRR = 2.02, 95% CI: 1.15, 3.54, p =

0.23 for interaction) and with the folk dance intervention (IRR = 1.68, 95% CI: 1.03, 2.73). There were no significant between-group differences in executive function test (TMT-B = 2.8 s, 95% CI: -6.2, 11.8). Intention to treat (ITT) analysis revealed no between-group differences at 12-mo follow-up in the secondary outcome measures, with the exception of postural sway, favouring the control group. Exploratory post hoc analysis by study completers and style indicated that ballroom dancing participants apparently improved their gait speed by 0.07 m/s relative to control participants (95% CI: 0.00, 0.14, p = 0.05). Study limitations included allocation to style based on logistical considerations rather than at random; insufficient power to detect differential impacts of different dance styles and smaller overall effects; variation of measurement conditions across villages; and no assessment of more complex balance tasks, which may be more sensitive to changes brought about by dancing.
CONCLUSIONS: Social dancing did not prevent falls or their associated risk factors among these retirement villages' residents. Modified dance programmes that contain "training elements" to better approximate structured exercise programs, targeted at low and high-risk participants, warrant investigation. TRIAL REGISTRATION: The Australian New Zealand Clinical Trials Registry ACTRN12612000889853.
PDF Y Endnote Y

The costs of fall-related injuries among older adults: annual per-faller, service component, and patient out-of-pocket costs
Hoffman GJ, Hays RD, Shapiro MF, Wallace SP, Ettner SL.
Health Serv. Res. 2016; ePub(ePub): ePub.
Affiliation: Division of General Internal Medicine and Health Services Research, David Geffen School of Medicine, UCLA, Los Angeles, CA.

DOI 10.1111/1475-6773.12554 **PMID** 27581952
Abstract
OBJECTIVE: To estimate expenditures for fall-related injuries (FRIs) among older Medicare beneficiaries.
DATA SOURCES: The 2007-2009 Medicare claims and 2008 Health and Retirement Study (HRS) data for 5,497 (228 FRI and 5,269 non-FRI) beneficiaries.
STUDY DESIGN: FRIs were indicated by inpatient/outpatient ICD-9 diagnostic codes for fractures, trauma, dislocations, and by e-codes. A pre-post comparison group design was used to estimate the differential change in pre-post expenditures for the FRI relative to the non-FRI cohort (FRI expenditures). Out-of-pocket (OOP) costs, service category total annual FRI-related Medicare expenditures, expenditures related to the type of initial FRI treatment (inpatient, ED, outpatient), and the risk of persistently high expenditures (4th quartile for each post-FRI quarter) were estimated.
PRINCIPAL FINDINGS: Estimated FRI expenditures were $9,389 (95 percent CI: $5,969-$12,808). Inpatient, physician/outpatient, skilled nursing facility, and home health comprised 31, 18, 39, and 12 percent of the total. OOP costs were $1,363.0 (95 percent CI: $889-$1,837). Expenditures for FRIs initially treated in inpatient/ED/outpatient settings were $21,424/$6,142/$8,622. The FRI cohort had a 64 percent increased risk of persistently high expenditures. Total Medicare expenditures were $13 billion (95 percent CI: $9-$18 billion).
CONCLUSIONS: FRIs are associated with substantial, persistent Medicare expenditures. Cost-effectiveness of multifactorial falls prevention programs should be assessed using these expenditure estimates.

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A perturbation mechanism for investigations of phase-dependent behavior in human locomotion
Villarreal DJ, Quintero D, Gregg RD.
IEEE Access 2016; 4: 893-904.
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DOI 10.1109/ACCESS.2016.2535661 **PMID** 27570719
Abstract
Bipedal locomotion is a popular area of study across multiple fields (e.g., biomechanics, neuroscience and robotics). Different hypotheses and models have tried explaining how humans achieve stable locomotion. Perturbations that produce shifts in the nominal periodic orbit of the joint kinematics during locomotion could inform about the manner in which the human neuromechanics represent the phase of gait. Ideally, this type of perturbation would modify the progression of the human subject through the gait cycle without deviating from the nominal kinematic orbits of the leg joints. However, there is a lack of publicly available experimental data with this type of perturbation. This paper presents the design and validation of a perturbation mechanism and an experimental protocol capable of producing phase-shifting perturbations of the gait cycle. The effects of this type of perturbation on the gait cycle are statistically quantified and analyzed in order to show that a clean phase shift in the gait cycle was achieved. The data collected during these experiments will be publicly available for the scientific community to test different hypotheses and models of human locomotion.
PDF Y Endnote Y

Bayesian cost-effectiveness analysis of falls risk assessment tools: falls: sensitivity and specificity-asking for decision support changes?
McNair DS, Simpson RL.
Nurs. Adm. Q. 2016; 40(4): 364-369.
Affiliation: Cerner Math Inc (Dr McNair) and Emory School of Nursing, Cerner Corporation (Dr Simpson), Kansas City, Missouri.

DOI 10.1097/NAQ.0000000000000194 **PMID** 27584899
Abstract [Abstract unavailable]
PDF Endnote Y

Body mass index, falls, and injurious falls among U.S. adults: findings from the 2014 Behavioral Risk Factor Surveillance System
Ylitalo KR, Karvonen-Gutierrez CA.
Prev. Med. 2016; ePub(ePub): ePub.
Affiliation: School of Public Health, University of Michigan, Ann Arbor, MI, United States.

DOI 10.1016/j.ypmed.2016.08.044 **PMID** 27575319
Abstract
Falls are an important health concern because they are associated with loss of independence and disability, particularly among women. We determined the age- and sex-specific prevalence of injurious falls among adults in the United States and examined the impact of obesity on fall risk. Self-reported falls, injurious falls, and health histories were obtained from 280,035 adults aged 45-79years in the 2014 Behavioral Risk Factor Surveillance System. Body mass index was categorized as underweight (<18.5kg/m(2)), normal weight (18.5-24.9kg/m(2)), overweight 25-29.9kg/m(2)), class I obesity (30.0-34.9kg/m(2)), or class II/III obesity (≥35.0kg/m(2)) based on self-reported height and weight. Data were analyzed using weighted age- and sex-specific prevalence rates and Poisson regression. Overall, 11.0% reported ≥1 injurious fall in the previous 12months. Mid-life women 55-

59years reported the highest prevalence of injurious falls (15.4%). Among mid-life women, overweight was associated with injurious falls (RR=1.17;95% CI:1.08,1.28), but overweight was not associated with falling among other age-sex groups. Class II/III obesity was associated with injurious falls among all age-sex groups. After considering the mediators like health conditions (depression, cardiovascular disease, diabetes, arthritis) and behaviors (physical activity, sleep), the association of class II/III obesity and injurious fall risk persisted only among mid-life women (RR=1.23;95% CI: 1.12,1.36). Not only are mid-life women at high risk for falls, but the class II/III obesity is a risk factor for injurious falls. Targeting mid-life women for fall and injury prevention is an important aim for practitioners, particularly given unique correlates of falling for this group.

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Comparing the incidence of falls/fractures in Parkinson's disease patients in the US population
Kalilani L, Asgharnejad M, Palokangas T, Durgin T.
PLoS One 2016; 11(9): e0161689.
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Abstract
Patients with Parkinson's disease (PD) may experience falls and/or fractures as a result of disease symptoms. There are limited data available from long-term studies estimating the incidence of falls/fractures in patients with PD. The objective was to compare the incidence rate of falls/fractures in PD patients with non-PD patients in a US population. This was a retrospective study using a US-based claims database (Truven Health MarketScan®) that compared the incidence rate of falls/fractures in PD subjects with non-PD subjects. The study period included the 12 months prior to index date (defined as earliest PD diagnosis [International Classification of Diseases, Ninth Revision, Clinical Modification code 332.0]) and a postindex period to the end of data availability. Fractures were defined by inpatient/outpatient claims as a principal or secondary diagnosis and accompanying procedure codes during the postindex period. Incidence rates and 95% CIs for falls/fractures were calculated as the number of events per 10,000 person-years of follow-up using negative binomial or Poisson regression models. Twenty-eight thousand two hundred and eighty PD subjects were matched to non-PD subjects for the analysis (mean [SD] age, 71.4 [11.8] years; 53% male). A higher incidence rate (adjusted for comorbidities and medications) of all fall/fracture cases and by fall and fracture types was observed for PD subjects versus non-PD subjects; the overall adjusted incidence rate ratio comparing PD to non-PD subjects was 2.05; 95% CI, 1.88-2.24. The incidence rate of falls/fractures was significantly higher in subjects with PD compared with non-PD subjects in a US population.
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Gait event detection in laboratory and real life settings: accuracy of ankle and waist sensor based methods
Storm FA, Buckley CJ, Mazzà C. Gait Posture 2016; 50: 42-46.
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DOI 10.1016/j.gaitpost.2016.08.012 **PMID** 27567451
Abstract
Wearable sensors technology based on inertial measurement units (IMUs) is leading the transition from laboratory-based gait analysis, to daily life gait monitoring. However, the validity of IMU-based methods for the detection of gait events has only been tested in laboratory settings, which may not reproduce real life walking patterns. The aim of this study was to evaluate the accuracy of two

algorithms for the detection of gait events and temporal parameters during free-living walking, one based on two shank-worn inertial sensors, and the other based on one waist-worn sensor. The algorithms were applied to gait data of ten healthy subjects walking both indoor and outdoor, and completing protocols that entailed both straight supervised and free walking in an urban environment. The values obtained from the inertial sensors were compared to pressure insoles data. The shank-based method showed very accurate initial contact, stride time and step time estimation (<14ms error). Accuracy of final contact timings and stance time was lower (28-51ms error range). The error of temporal parameter variability estimates was in the range 0.09-0.89%. The waist method failed to detect about 1% of the total steps and performed worse than the shank method, but the temporal parameter estimation was still satisfactory. Both methods showed negligible differences in their accuracy when the different experimental conditions were compared, which suggests their applicability in the analysis of free-living gait.

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Mortality from unspecified unintentional injury among individuals aged 65 years and older by U.S. state, 1999-2013
Cheng X, Wu Y, Yao J, Schwebel DC, Hu G.
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DOI 10.3390/ijerph13080763 **PMID** 27472356
Abstract
INTRODUCTION: Recent changes in unspecified unintentional injury mortality for the elderly by U.S. state remain unreported. This study aims to examine U.S. state variations in mortality from unspecified unintentional injury among Americans aged 65+, 1999-2013;
METHODS: Using mortality rates from the U.S. CDC's Web-based Injury Statistics Query and Reporting System (WISQARS™), we examined unspecified unintentional injury mortality for older adults aged 65+ from 1999 to 2013 by state. Specifically, the proportion of unintentional injury deaths with unspecified external cause in the data was considered. Linear regression examined the statistical significance of changes in proportion of unspecified unintentional injury from 1999 to 2013; Results: Of the 36 U.S. states with stable mortality rates, over 8-fold differences were observed for both the mortality rates and the proportions of unspecified unintentional injury for Americans aged 65+ during 1999-2013. Twenty-nine of the 36 states showed reductions in the proportion of unspecified unintentional injury cause, with Oklahoma (-89%), Massachusetts (-86%) and Oregon (-81%) displaying the largest changes. As unspecified unintentional injury mortality decreased, mortality from falls in 28 states and poisoning in 3 states increased significantly. Mortality from suffocation in 15 states, motor vehicle traffic crashes in 12 states, and fire/burn in 8 states also decreased; Conclusions: The proportion of unintentional injuries among older adults with unspecified cause decreased significantly for many states in the United States from 1999 to 2013. The reduced proportion of unspecified injury has implications for research and practice. It should be considered in state-level trend analysis during 1999-2013. It also suggests comparisons between states for specific injury mortality should be conducted with caution, as large differences in unspecified injury mortality across states and over time could create bias for specified injury mortality comparisons.
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Optimism, cynical hostility, falls and fractures: the Women's Health Initiative Observational Study (WHI-OS)

Cauley JA, Smagula SF, Hovey KM, Wactawski-Wende J, Andrews CA, Crandall CJ, LeBoff MS, Li W, Coday M, Sattari M, Tindle HA.

J. Bone Miner. Res. 2016; ePub(ePub): ePub.

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Abstract

Traits of optimism and cynical hostility are features of personality that could influence the risk of falls and fractures by influencing risk taking behaviors, health behaviors or inflammation. To test the hypothesis that personality influences falls and fracture risk, we studied 87,342 women enrolled in WHI-OS. Optimism was assessed by the Life Orientation Test - Revised and cynical hostility, the cynicism subscale of the Cook-Medley questionnaire. Higher scores indicate greater optimism and hostility. Optimism and hostility were correlated at $r = -0.31$, $p < 0.001$. Annual self-report of falling ≥2 times in the past year was modeled using repeated measures logistic regression. Cox proportional hazards models were used for the fracture outcomes. We examined the risk of falls and fractures across the quartiles (Q) of optimism and hostility with tests for trends; Q1 formed the referent group. The average follow-up for fractures was 11.4 years; falls, 7.6 years. In multivariable (MV) adjusted models, women with the highest optimism scores (Q4) were 11% less likely to report ≥2 falls in the past year, odds ratio (OR) = 0.89 (95% confidence intervals (CI), 0.85-0.90). Women in Q4 for hostility had a 12% higher risk of ≥2 falls, OR = 1.12 (95% CI, 1.07-1.17). Higher optimism scores were also associated with a 10% lower risk of fractures but this association was attenuated in MV models. Women with the greatest hostility (Q4) had a modest increased risk of any fracture, MV adjusted hazard ratio = 1.05 (95% CI, 1.01-1.09) but there was no association with specific fracture sites. In conclusion, optimism was independently associated with a decreased risk of ≥2 falls, and hostility, an increased risk of ≥2 falls, independent of traditional risk factors. The magnitude of the association was similar to aging 5 years. Whether interventions aimed at attitudes could reduce fall risks remains to be determined. This article is protected by copyright. All rights reserved.

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