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A 9-week Jaques-Dalcroze eurhythmics intervention improves single and dual-task gait speed in community-dwelling older people

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(Copyright © 2017, Human Kinetics Publishers)

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Abstract

BACKGROUND: Falls are a major public health concern among older adults, and most occur while walking, especially under dual-task conditions. Jaques-Dalcroze eurhythmics (JDE) is a music-based movement training program that emphasizes multitask coordinated movement. A previous 6-mo JDE study in older people demonstrated improved gait and balance; however, the effects of short-term JDE interventions on fall risk-related outcomes are largely unknown. We conducted a preliminary investigation on whether a 9-week JDE intervention improved gait and stability in a community-dwelling older cohort, hypothesizing that improvements would occur in all outcome measures.

METHODS: Nine participants (78.9 ± 12.3 y) completed the supervised JDE intervention (once/week for 60 min). Gait speed was determined by the 6-m timed walk test (6MTW); dual-task gait speed was determined by another 6MTW while counting backward from 50 aloud; and coordinated stability was assessed using a Swaymeter-like device.

RESULTS: Gait speed (0.92 ± 0.11 vs 1.04 ± 0.12 m/sec, $P = .04$) and dual-task gait speed (0.77 ± 0.09 vs 0.92 ± 0.11 m/sec, $P = .0005$) significantly improved.

CONCLUSIONS: This novel intervention is an effective short-term physical activity option for those that plan physical activity or fall-risk reduction programs for the older people.

PDF Y Endnote Y

Assessing balance through the use of a low-cost head-mounted display in older adults: a pilot study

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Clin. Interv. Aging 2017; 12: 1363-1370.

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Abstract

INTRODUCTION: As the population ages, the prevention of falls is an increasingly important public health problem. Balance assessment forms an important component of fall-prevention programs for older adults. The recent development of cost-effective and highly responsive virtual reality (VR) systems means new methods of balance assessment are feasible in a clinical setting. This proof-of-concept study made use of the submillimeter tracking built into modern VR head-mounted displays (VRHMDs) to assess balance through the use of visual-vestibular conflict. The objective of this study was to evaluate the validity, acceptability, and reliability of using a VRHMD to assess balance in older adults.

MATERIALS AND METHODS: Validity was assessed by comparing measurements from the VRHMD to measurements of postural sway from a force plate. Acceptability was assessed through the use of the Simulator Sickness Questionnaire pre- and postexposure to assess possible side effects of the visual-vestibular conflict. Reliability was assessed by measuring correlations between repeated

measurements 1 week apart. Variables of possible importance that were found to be reliable ($r \geq 0.9$) between tests separated by a week were then tested for differences compared to a control group. Assessment was performed as a cross-sectional single-site community center-based study in 13 older adults (≥ 65 years old, 80.2 ± 7.3 years old, 77% female, five at risk of falls, eight controls). The VR balance assessment consisted of four modules: a baseline module, a reaction module, a balance module, and a seated assessment.

RESULTS: There was a significant difference in the rate at which participants with a risk of falls changed their tilt in the anteroposterior direction compared to the control group. Participants with a risk of falls changed their tilt in the anteroposterior direction at $0.7^\circ/\text{second}$ vs $0.4^\circ/\text{second}$ for those without a history of falls. No significant differences were found between pre/postassessment for oculomotor score or total Simulator Sickness Questionnaire score. Both the force plate and the head-mounted display balance-assessment system were able to detect differences between conditions meant to mask visual and proprioceptive information.

CONCLUSION: This VRHMD is both affordable and portable, causes minimal simulator sickness, and produces repeatable results that can be used to assess balance in older adults.

PDF Y Endnote Y

Canadian Study of Health and Aging Clinical Frailty Scale: does it predict adverse outcomes among geriatric trauma patients?

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J. Am. Coll. Surg. 2017; ePub(ePub): ePub.

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DOI 10.1016/j.jamcollsurg.2017.08.008 **PMID** 28888692

Abstract

BACKGROUND: The Canadian Study of Health and Aging Clinical Frailty Scale (CFS) and the laboratory Frailty Index (FI-lab) are validated tools based on clinical and laboratory data, respectively. Their utility as predictors of geriatric trauma outcomes is unknown. Our primary objective was to determine whether pre-admission CFS is associated with adverse discharge destination. Secondary objectives were to evaluate the relationships between CFS and in-hospital complications and between admission FI-lab and discharge destination.

STUDY DESIGN: We performed a 4-year (2011 to 2014) retrospective cohort study with patients 65 years and older admitted to a level I trauma center. Admission FI-lab was calculated using 23 variables collected within 48 hours of presentation. The primary outcome was discharge destination, either adverse (death or discharge to a long-term, chronic, or acute care facility) or favorable (home or rehabilitation). The secondary outcome was in-hospital complications. Multivariable logistic regression was used to evaluate the relationship between CFS or FI-lab and outcomes.

RESULTS: There were 266 patients included. Mean age was 76.5 ± 7.8 years and median Injury Severity Score was 17 (interquartile range 13 to 24). There were 260 patients and 221 patients who had sufficient data to determine CFS and FI-lab scores, respectively. Pre-admission frailty as per the CFS (CFS 6 or 7) was independently associated with adverse discharge destination (odds ratio 5.1; 95% CI 2.0 to 13.2; $p < 0.001$). Severe frailty on admission, as determined by the FI-lab (FI-lab > 0.4), was not associated with adverse outcomes.

CONCLUSIONS: Pre-admission clinical frailty independently predicts adverse discharge destination in geriatric trauma patients. The CFS may be used to triage resources to mitigate adverse outcomes in this population. The FI-lab determined on admission for trauma may not be useful.

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Community capacity building for physical activity promotion among older adults-a literature review

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Int. J. Environ. Res. Public Health 2017; 14(9): e14091058.

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Abstract

Community-based interventions to promote physical activity (PA) among older adults are of high interest in health promotion since they promise to be effective strategies to reach this population group. Community capacity building, that is, the local promotion of knowledge, skills, commitment, structures, and leadership, is among the recommended core strategies. However, little guidance is provided on how to achieve a high degree of community capacity. This study aims to identify practical strategies to enhance community capacities for PA promotion among older adults (50 years or older) and to evaluate their success. A literature review was conducted using scientific databases (PsycInfo and Web of Sciences) and grey literature (national and international project databases), and 14 studies (16 articles) were identified. Five groups of capacity building strategies emerged from the literature: (1) building community coalitions and networks, (2) training of professionals, (3) training of laypersons, (4) strengthening competence and awareness in the target population, and (5) allocation of financial resources. All studies used more than one strategy. Coalition building and strengthening competence and awareness were most frequently used. Feasibility and acceptability of the capacity building strategies were demonstrated. However, intervention effects on PA behavior and other relevant outcomes were inconsistent. The one study that systematically compared different capacity building approaches did not find any evidence for beneficial effects of intensified capacity building. More rigorous research evaluating the efficacy of specific strategies to enhance community capacities for PA promotion is needed.

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Derivation of a frailty index from the resident assessment instrument - home care adapted for Switzerland: a study based on retrospective data analysis

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BMC Geriatr. 2017; 17(1): e205.

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DOI 10.1186/s12877-017-0604-3 **PMID** 28882127

Abstract

BACKGROUND: The screening of frail individuals at risk for functional health decline and adverse health outcomes lies in the evolving agenda of home care providers. Such a screening can be based on a frailty index (FI) derived from data collected with interRAI instruments used in clinical routines to define care plans. The objective of this study was to assess the feasibility of deriving an FI from the Resident Assessment Instrument - Home Care adapted for Switzerland (Swiss RAI-HC).

METHODS: Data were collected by the Geneva Institution for Homecare and Assistance in clinical routines. The sample consisted of 3714 individuals aged 65 or older (67.7% females) who had each received a Swiss RAI-HC upon admission in the year of 2015. The FI was derived from 52 variables identified and scored according to published guidelines. Adverse health outcomes were either assessed during follow-up assessments (falls, hospitalizations) or documented from administrative records (mortality).

RESULTS: The results showed that the FI was distributed normally, with a mean of 0.24 (\pm 0.13), an interquartile range of 0.16, and values of 0.04 at percentile 1 and 0.63 at percentile 99. The effect of Age was significant ($R^2 = 0.011$) with a slope of $\beta = 0.002$, 95% CI = [0.001-0.002]. Sex as well as the Age \times Sex interaction were not significant. The FI predicted deaths (OR = 9.99, 95% CI = [3.20-29.99]), hospitalizations (OR = 3.40, 95% CI = [1.78-6.32]), and falls (OR = 5.00, 95% CI = [2.68-9.38]).

CONCLUSIONS: The results support the feasibility of an FI derivation from the Swiss RAI-HC, hence replicating previous demonstrations based on interRAI instruments. The results also replicated findings showing that the FI is a good predictor of adverse health outcomes. Yet, the results suggest that home care recipients demonstrate a frailty pattern different from the one reported in community dwellers but comparable to clinical samples. Further work is needed to assess the characteristics of the proposed index in community-dwelling, non-clinical samples for comparability with the existing literature and external validation TRIAL REGISTRATION: ClinicalTrials.gov NCT03139162. Retrospectively registered May 2, 2017.

PDF Y Endnote Y

Does dual task training improve walking performance of older adults with concern of falling?

Wollesen B, Schulz S, Seydell L, Delbaere K. BMC Geriatr. 2017; 17(1): e213.

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DOI 10.1186/s12877-017-0610-5 **PMID** 28893187

Abstract

BACKGROUND: Older adults with concerns of falling show decrements of gait stability under single (ST) and dual task (DT) conditions. To compare the effects of a DT training integrating task managing strategies for independent living older adults with and without concern about falling (CoF) to a non-training control group on walking performance under ST and DT conditions.

METHODS: Single center parallel group single blind randomized controlled trial with group-based interventions (DT-managing balance training) compared to a control group (Ninety-five independent living older adults; 71.5 ± 5.2 years). A progressive DT training (12 sessions; 60 min each; 12 weeks) including task-managing strategies was compared to a non-training control group. **SETTING:** group based intervention for independent living elderly in a gym. ST and DT walking (visual verbal Stroop task) were measured on a treadmill. Gait parameters (step length, step width, and gait line) and cognitive performance while walking were compared with a 2x2x2 Repeated Measures Analyses of Variance.

RESULTS: Participants in the intervention group showed an increased step length under ST and DT conditions following the intervention, for both people with and without CoF compared to their respective control groups. Foot rolling movement and cognitive performance while walking however only improved in participants without CoF.

CONCLUSIONS: The results showed that DT managing training can improve walking performance under ST and DT conditions in people with and without CoF. Additional treatment to directly address CoF, such as cognitive behavioural therapy, should be considered to further improve the cautious gait pattern (as evidenced by reduced foot rolling movements). **TRIAL REGISTRATION:** The study was retrospectively registered in the German Clinical Trials Register (DRKS; Identification number DRKS00012382 , 11.05.2017).

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Fall prevention: empowering people through online education

Frith J.

Ann. Fam. Med. 2017; 15(5): 482.

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DOI 10.1370/afm.2138 **PMID** 28893821

Abstract [Abstract unavailable]

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Gender, success, and drop-out during a resistance exercise program in community dwelling old adults

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J. Aging Res. 2017; 2017: e5841083.

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DOI 10.1155/2017/5841083 **PMID** 28890833 **PMCID** PMC5584358

Abstract

BACKGROUND: Resistance exercise training can be effective against sarcopenia. We identified predictors of drop-out and compared physical outcomes between men and women after such training.

METHODS: Subjects (N = 236, 73.7 ± 5.7 years) participated in a 12-week resistance exercise program. Outcome variables were measured at baseline and endpoint.

RESULTS: Drop-out was 11.9% and not significantly different between genders. Drop-outs were significantly older and had poorer strength and physical function in comparison to completers. Anthropometrics, QoL, and cognitive function were not related to drop-out. According to multivariate analysis, gait speed and physical activity were the strongest predictors of drop-out. After the training, gains in lean mass or appendicular muscle were significantly higher in men than women; however relative gains in appendicular muscle as well as absolute improvements in strength and function were similar in men and women, respectively.

CONCLUSIONS: Participants who drop out are older, have poorer physical function, and are less physically active. Old women do not drop out more frequently than men and show meaningful improvements in relevant outcomes similar to men after such a training program.

The trial is registered at the US National Library of Medicine (NCT01074879).

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Pedestrian falls: a review of the literature and future research directions

Schepers P, den Brinker B, Methorst R, Helbich M.

J. Saf. Res. 2017; 62: 227-234.

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DOI 10.1016/j.jsr.2017.06.020 **PMID** 28882270

Abstract

INTRODUCTION: Pedestrian falls (PFs) - falls in public spaces without collisions with other road users - are a significant cause of serious transport-related injuries, amounting to three-quarters of all pedestrians admitted to hospital.

METHODS: This scoping review examined peer-reviewed research on PFs published between 1995 and 2015. Electronic databases (Scopus, SafetyLit, and PubMed) were used to find studies identifying PFs or outdoor falls (the latter also including falls in gardens).

RESULTS: We identified only 28 studies reporting relevant information on PFs (i.e., 15 prospective, 10 retrospective, and 3 intervention studies). The results show that more walking is related to a lower risk of PFs. Older people, especially older women, have a higher risk of (injurious) PFs. Outdoor fall victims have equally good or better health characteristics and scores on balance tests compared to those who have not experienced such falls. Road factors such as uneven surfaces, busy junctions, stairs, and slippery surfaces seem to play an important role in PFs, but much of the research on these factors is of a qualitative nature.

CONCLUSIONS: PF victims are generally in good health (apart from normal age-related problems) but at risk due to road factors. **PRACTICAL APPLICATIONS:** We recommend to adopt a human factors approach. The road system should be adapted to human capabilities and limitations including those of pedestrians. Measures such as preventing uneven surfaces and good winter maintenance seem to be effective. However, we advise more quantitative research on road factors to inform design guidelines and standards for public space authorities given the qualitative nature of current research on road factors.

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Preliminary evaluation of prototype footwear and insoles to optimise balance and gait in older people

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BMC Geriatr. 2017; 17(1): e212.

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DOI 10.1186/s12877-017-0613-2 **PMID** 28893202

Abstract

BACKGROUND: Footwear has the potential to influence balance in either a detrimental or beneficial manner, and is therefore an important consideration in relation to falls prevention. The objective of this study was to evaluate balance ability and gait patterns in older women while wearing prototype footwear and insoles designed to improve balance.

METHODS: Older women (n = 30) aged 65 - 83 years (mean 74.4, SD 5.6) performed a series of laboratory tests of balance ability (postural sway on a foam rubber mat, limits of stability and tandem walking, measured with the Neurocom® Balance Master) and gait patterns (walking speed, cadence, step length and step width at preferred speed, measured with the GAITRite® walkway) while wearing (i) flexible footwear (Dunlop Volley™), (ii) their own footwear, and (iii) prototype footwear and insoles designed to improve dynamic balance. Perceptions of the footwear were also documented using a structured questionnaire.

RESULTS: There was no difference in postural sway, limits of stability or gait patterns between the footwear conditions. However, when performing the tandem walking test, there was a significant reduction in step width and end sway when wearing the prototype footwear compared to both the flexible footwear and participants' own footwear. Participants perceived their own footwear to be more attractive, comfortable, well-fitted and easier to put on and off compared to the prototype footwear. Despite this, most participants (n = 18, 60%) reported that they would consider wearing the prototype footwear to reduce their risk of falling.

CONCLUSION: The prototype footwear and insoles used in this study improve balance when performing a tandem walk test, as evidenced by a narrower step width and decreased sway at completion of the task. However, further development of the design is required to make the footwear acceptable to older women from the perspective of aesthetics and comfort.

TRIAL REGISTRATION: Australian New Zealand Clinical Trials Registry. ACTRN12617001128381 , 01/08/2017 (retrospectively registered).

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Preventing fall injuries with impact absorbing flooring in nursing homes - a study of the effects on injuries and work environment (Safety-2016 abstract #98)

Gustavsson J.

Inj. Prev. 2016; 22(Suppl 2): A37.

(Copyright © 2016, BMJ Publishing Group)

DOI 10.1136/injuryprev-2016-042156.98 **PMID** unavailable

Abstract

BACKGROUND: Fall injuries pose a global public health problem. Whilst all elderly are at risk of fall injuries, the risk of injury is 10 times as high amongst elderly living in nursing homes. An injury occurs when body tissue is subjected to external kinetic energy exceeding the tissue's tolerance. Reducing this energy in order to prevent injuries has been successfully applied in many fields. A impact absorbing floor as an energy reducing measure to prevent fall injuries has been evaluated. The aim of this study is to investigate the potential fall injury reducing effects of impact absorbing flooring in a nursing home, as well as the staff's experience of working in premises with impact absorbing flooring.

METHODS: The intervention site is a nursing home in Sweden where impact absorbing flooring was installed. To investigate the fall injury reducing effect falls on impact absorbing flooring were compared to falls on regular flooring. To describe how the staff presided working in premises with special flooring a qualitative focus group interview study were conducted.

RESULTS: The results show that for women the risk of injury following a fall on the impact absorbing flooring was 59% less compared to falls on ordinary floors, after adjustment for age, BMI, vision impairments, and cognitive impairment. With regards to the staff's experience of the impact absorbing flooring, the nurses felt that the floor defused the falls and in that way reduced the risk of

injury. They were also positively surprised by the change in acoustics. There were also some challenges associated with the floor, for example, adapting to walking on the floor and manoeuvring equipment (eg hoists).

CONCLUSIONS: The results suggest that for an elderly and frail population, impact absorbing flooring seems to be an effective injury prevention measure. The intervention was generally perceived as positive by the staff, even though some negative aspects were observed. These aspects need to be studied further.

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Service-learning enhances physical therapy students' ability to examine fall risk in older adults

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DOI unavailable **PMID** 28889172

Abstract

Service-learning (SL) is one educational methodology that provides students opportunities to practice and refine affective, cognitive and psychomotor skills in a community-based setting.

PURPOSE: The aims of this study were: 1) to investigate the impact of SL on physical therapy (PT) students' attitudes and perceived clinical competence when working with older adults, and 2) to evaluate the difference between perceptions of students who developed and implemented the SL activity vs those who implemented only.

METHODS: Eighty PT students, (from two consecutive cohorts) enrolled in a first-year geriatrics course, participated in this study. The first cohort designed and implemented the SL activities, while the second cohort only implemented these activities. Student self-perceived anxiety, confidence, knowledge and skills were assessed by pre- and post-SL surveys using a 5- point Likert-like scale.

RESULTS: Both cohorts reported similar anxiety and confidence levels pre-SL. For both cohorts, with the exception of one item, all responses to anxiety items significantly decreased from pre- to post-SL. All students' confidence levels for assessing and mitigating fall risk in older adults increased post-SL ($p < 0.01$). Moreover, students in cohort 1, who designed and delivered SL activities, expressed self-perceived improvement in their ability to interpret results of evaluations, to determine type and severity of balance impairments, and to serve a geriatric population ($p < 0.05$) compared to students in cohort 2 who only implemented the activities.

CONCLUSION: Embedding SL into a geriatrics course decreased self-perceived anxiety and improved student confidence regarding working with older adults. Also, empowering students to be actively involved in the design and implementation of SL increased self-perceived ability in interpreting results from assessments.

PDF N Endnote Y

Simple diagnostic signs in those with cognitive impairment-anything to improve detection of cognitive disorders

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Int. Psychogeriatr. 2017; ePub(ePub): 1.

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(Copyright © 2017, Cambridge University Press)

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Abstract

With now over 50 million people worldwide with dementia (Prince et al., 2013), there are almost certainly well over 100 million people with cognitive concerns and many of these will attend their health professional keen to know what is going on. We need those without intensive training in this field to be more confident and correct in their diagnosis when such a concerned person turns up. Many simple diagnostic tests have been proposed and some assessed - these include the walk and talk (divided attention) test (those who stop when asked a question while walking may be cognitively impaired) (Lamoth et al., 2011), the clock drawing test (Brodaty and Moore, 1997), the "handbag" sign (those clutching their personal possessions are more likely to be cognitively impaired) and the "hippopotamus sign" (calling the rhinoceros, in those tests that include this, a hippopotamus). Simple screening tests have been extensively validated and are important to the clinician in formulating a diagnosis (Lorentz et al., 2002). The "head-turning" and the "attended with/alone" signs are frequently observed, and many clinicians assessing such individuals would be well aware of them and probably even unknowingly factor them into their diagnosis. In this issue, Pinar Soysal and colleagues (Soysal et al., 2017) have evaluated these signs and, in those older people attending with cognitive concerns, found they had quite good diagnostic value. They were not very specific but showed good sensitivity and negative predictive value. Indeed, at the recent Alzheimer's Association International Conference in London there were several posters evaluating "soft but simple" signs although not all performed as expected - one group found gait actually sped up in those with cognitive impairment that were asked a question.

PDF Y Endnote Y

The effects of early stages of aging on postural sway: a multiple domain balance assessment using a force platform

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

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Abstract

Technical advancements in instrumentation and analytical methods have improved the ability of assessing balance control. This study investigated the effects of early stages of aging on postural sway using traditional and contemporary postural indices from different domains. Eleven healthy young adults and fourteen healthy non-faller older adults performed two postural tasks: (a) functional limits of stability and (b) unperturbed bipedal stance for 120s. Postural indices from spatial, temporal, frequency, and structural domains were extracted from the body's center of

pressure (COP) signals and its Rambling and Trembling components.

RESULTS: revealed a preservation of functional limits of upright stability in older adults accompanied by larger, faster, and shakier body sway in both anterior-posterior and medio-lateral directions; increased medio-lateral sway frequency; increased irregularity of body sway pattern in time in both directions; and increased area, variability, velocity, and jerkiness of both rambling and trembling components of the COP displacement in the anterior-posterior direction ($p < 0.02$). Such changes might be interpreted as compensatory adjustments to the age-related decline of sensory, neural, and motor functions. In conclusion, balance assessment using postural indices from different domains extracted from the COP displacement was able to capture subtle effects of the natural process of aging on the mechanisms of postural control. Our findings suggest the use of such indices as potential markers for postural instability and fall risk in older adults.

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The elderly and falls: factors associated with quality of life -- a cross-sectional study using large-scale national data in Korea

Noh JW, Kim KB, Lee JH, Lee BH, Kwon YD, Heui Lee S.

Arch. Gerontol. Geriatr. 2017; 73: 279-283.

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DOI 10.1016/j.archger.2017.08.008 **PMID** 28886493

Abstract

OBJECTIVE: To investigate the factors of fall injury and measuring the relationship between health-related quality of life in the elderly.

METHODS: We analyzed the data on 38,627 persons of aged 65 years or older who have experienced falls drawn from the Korean Community Health Survey 2011. Binomial logistic regression analysis was performed with crude and adjusted odds ratios and 95% confidence intervals.

RESULTS: It was found that sex (OR: 1.187), types of household (OR: 1.134), employment status (OR: 0.941), stress (OR: 1.260), comorbidities (OR: 1.308), and health-related quality of life were significantly related to falls among the elderly. Specifically, elderly women, greater stress, comorbidities, and poor health-related quality of life were strongly related to higher odds of falls.

CONCLUSION: Health-related quality of life was significantly related with the risk of fall injuries in elderly households. Providing support for informal caregivers (e.g., friends or neighbors), not only family members could expect to positive effect.

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Yarning, giving a voice to older aboriginal people on healthy ageing and fall prevention (Safety-2016 abstract #60)

Coombes J, Lukaszuk C, Keay L, Sherrington C, Tiedemann A, Ivers R.

Inj. Prev. 2016; 22(Suppl 2): A23-A24.

(Copyright © 2016, BMJ Publishing Group)

DOI 10.1136/injuryprev-2016-042156.60 **PMID** unavailable

Abstract

BACKGROUND: There is emerging evidence that falls are an increasing problem for older Aboriginal people in Australia. We examined concepts of healthy ageing and fall prevention using Aboriginal ontology and knowledge systems through yarning circles in Aboriginal communities in Australia.

METHODS: We used a conversational method to gather knowledge through yarning circles with Aboriginal communities in the Central Coast, Dubbo, Mt Druitt and Shoalhaven areas of New South Wales, Australia. The yarning circles were held with 80 people aged from 45 to 85 years of age, in 8 groups between November 2014 and April 2015. Data were audio recorded and transcribed with the consent of communities and analysed using an Indigenous research standpoint methodology, incorporating ways of knowing, doing and being.

RESULTS: Yarning circles helped identify key issues around healthy ageing including the role of falls, in particular the impact these have on individuals, their families and communities. Discussions around falls highlighted concerns that they would lead to an inability to fulfil family roles or remain involved in community life. Participants reported that healthy ageing and maintaining independence were imperative in enabling them to continue to pass on cultural knowledge, and that they were comfortable attending health-related programs in their own communities.

CONCLUSIONS: Aboriginal people felt comfortable attending programs in their own community and yarning circle participants voiced strongly that healthy ageing is essential for them to continue to share their knowledge of Aboriginal history and culture to their families and communities. Yarning circles also identified the need for Aboriginal-specific, culturally appropriate fall prevention programs to address healthy ageing and concerns about falls.

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Association between gait and dual task with cognitive domains in older people with cognitive impairment

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DOI 10.1080/00222895.2017.1363702 **PMID** 28901834

Abstract

The authors investigated whether impaired gait and dual-task performances are associated with specific cognitive domains among older people with preserved cognition (PC), mild cognitive impairment (MCI), and mild Alzheimer's disease (AD). The sample comprised 40 older adults with PC, 40 with MCI, and 38 with mild AD. The assessment consisted of gait (measured by 10-m walk test and Timed Up and Go Test [TUGT]), dual task (measured by TUGT associated with a cognitive-motor task of calling a phone number), and cognition (domains of the Addenbrooke Cognitive Examination-Revised and Frontal Assessment Battery [FAB]). For data analysis, the Pearson product-moment correlation and the backward stepwise linear regression were conducted. Language, fluency, and visuospatial domains predicted the 10-m walk test measure specifically in PC, MCI, and AD groups. Only the visuospatial domain was independently associated with the TUGT measure in the MCI and AD groups. FAB score, language domain, and FAB score and fluency domain were the strongest

predictors for the isolated cognitive-motor task measure in the PC, MCI, and AD groups, respectively. The visuospatial domain was independently associated with the dual-task test measure in all 3 groups. The study findings demonstrate the influence of specific cognitive domains in daily mobility tasks in people with different cognitive profiles.

PDF Y Endnote Y

Dynamic balance in persons with multiple sclerosis who have a falls history is altered compared to non-fallers and to healthy controls

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

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Abstract

Around 60% of persons with multiple sclerosis (MS) experience falls, however the dynamic balance differences between those who fall and those who don't are not well understood. The purpose of this study is to identify distinct biomechanical features of dynamic balance during gait that are different between fallers with MS, non-fallers with MS, and healthy controls. 27 recurrent fallers with MS, 28 persons with MS with no falls history, and 27 healthy controls walked on a treadmill at their preferred speed for 3min. The variability of trunk accelerations and the average and variability of minimum toe clearance, spatiotemporal parameters, and margin of stability were compared between groups. Fallers with MS exhibited a slower cautious gait compared to non-fallers and healthy controls, but had decreased anterior-posterior margin of stability and minimum toe clearance. Fallers walked with less locally stable and predictable trunk accelerations, and increased variability of step length, stride time, and both anterior-posterior and mediolateral margin of stability compared to non-fallers and healthy controls. The present work provides evidence that within a group of persons with MS, there are gait differences that are influenced by falls history. These differences indicate that in persons with MS who fall, the center of mass is poorly controlled through base of support placement and the foot is closer to the ground during swing phase relative to the non-fallers. These identified biomechanical differences could be used to evaluate dynamic balance in persons with MS and to help improve fall prevention strategies.

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PDF Y Endnote Y

Effects of different montages of transcranial direct current stimulation on the risk of falls and lower limb function after stroke

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(Copyright © 2017, Forefront Publishing Group)

DOI 10.1080/01616412.2017.1371473 **PMID** 28885111

Abstract

BACKGROUND: Stroke is associated with high rates of falling and severe impairment of lower limb in patients who survive.

OBJECTIVE: The aim of this study was to analyze the effectiveness of different montages of transcranial direct current stimulation (tDCS) on reducing falls and on lower limb function after acute stroke.

METHODS: Sixty participants with acute stroke were randomly allocated into four groups with different electrode's setups: anodal, cathodal, bilateral and sham tDCS. Each patient received 10 stimulation sessions (five consecutive days for two weeks). Four Square Step Test, Occurrence of Falling Index, Overall Stability Index, Falls Efficacy Scale - International, Berg Balance Scale, Six-minute walk test and Sit to Stand Test were measured at baseline, post-treatment, and at one- and three-month follow-up.

RESULTS: At baseline, no differences between the groups in terms of clinical and demographic characteristics were found. However, after treatment and during follow up, all the groups that received active stimulation showed greater reduction in the risk of falls and improved performance of the lower limb's motor skills when compared to the sham group. No significant differences were found between the three types of active montages in relation to the risk of falling. In relation to lower limb function, bilateral stimulation provided a higher improvement when compared to anodal and cathodal tDCS.

CONCLUSIONS: This is the first trial with different setups of tDCS on acute stroke patients. tDCS presents as an effective treatment strategy in reducing the risk of falls and improving lower limb function after a stroke. ClinicalTrials.gov (NCT 02422173).

PDF Y Endnote Y

Evaluation design of Urban Health Centres Europe (UHCE): preventive integrated health and social care for community-dwelling older persons in five European cities

Franse CB, Voorham AJ, van Staveren R, Koppelaar E, Martijn R, Valía-Cotanda E, Alhambra-Borrás T, Rentoumis T, Bilajac L, Marchesi VV, Rukavina T, Verma A, Williams G, Clough G, Garcés-Ferrer J, Raso FM, Raat H.

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DOI 10.1186/s12877-017-0606-1 **PMID** 28893178

Abstract

BACKGROUND: Older persons often have interacting physical and social problems and complex care needs. An integrated care approach in the local context with collaborations between community-, social-, and health-focused organisations can contribute to the promotion of independent living and quality of life. In the Urban Health Centres Europe (UHCE) project, five European cities (Greater Manchester, United Kingdom; Pallini (in Greater Athens Area), Greece; Rijeka, Croatia; Rotterdam, the Netherlands; and Valencia, Spain) develop and implement a care template that integrates health and social care and includes a preventive approach. The UHCE project includes an effect and process evaluation.

METHODS: In a one-year pre-post controlled trial, in each city 250 participants aged 75+ years are recruited to receive the UHCE approach and are compared with 250 participants who receive 'care as usual'. Benefits of UHCE approach in terms of healthy life styles, fall risk, appropriate medication

use, loneliness level and frailty, and in terms of level of independence and health-related quality of life and health care use are assessed. A multilevel modeling approach is used for the analyses. The process evaluation is used to provide insight into the reach of the target population, the extent to which elements of the UHCE approach are executed as planned and the satisfaction of the participants.

DISCUSSION: The UHCE project will provide new insight into the feasibility and effectiveness of an integrated care approach for older persons in different European settings. **TRIAL REGISTRATION:** ISRCTN registry number is ISRCTN52788952. Date of registration is 13/03/2017.

PDF Y Endnote Y

Falls in people with multiple sclerosis: experiences of 115 fall situations

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Clin. Rehabil. 2017; ePub(ePub): 269215517730597.

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DOI 10.1177/0269215517730597 **PMID**28901164

Abstract

OBJECTIVES: The aim was to describe falls and the perceived causes, experienced by people with multiple sclerosis shortly after falling.

DESIGN: A qualitative study using content analysis and quantitative data to illustrate where and why people report falls most commonly. Semi-structured telephone interviews were performed.

Interviews were conducted shortly (0-10 days) after a fall. **SUBJECTS:** In all, 67 informants who had reported at least one fall during the previous three-month period and who used a walking aid participated.

RESULTS: A total of 57 (85%) informants fell at least once during eight months resulting in 115 falls; 90 (78%) falls happened indoors, most commonly in the kitchen (n = 20; 17%) or bathroom (n = 16; 14%). Informants fell during everyday activities and walking aids had been used in more than a third of the reported falls. The falls were influenced of both intrinsic and extrinsic factors. Two categories emerged from the analysis: 'activities when falling' and 'influencing factors'. The category contained three (basic activities of daily living, instrumental activities of daily living and leisure and work) and six (multiple sclerosis-related symptoms, fluctuating body symptoms, being distracted, losing body control, challenging surrounding and involvement of walking aid) subcategories, respectively.

CONCLUSION: The majority of falls occurs indoors and in daily activities. Several factors interacted in fall situations and should be monitored and considered to reduce the gap between the person's capacity and the environmental demands that cause fall risk. Fluctuation of bodily symptoms between and within a day is a variable not earlier targeted in multiple sclerosis fall risk research.

PDF Y Endnote Y

Feasibility of assessing falls risk and promoting falls prevention in beauty salons

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J. Prim. Prev. 2017; ePub(ePub): ePub.

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Abstract

Falls are a major public health risk and a leading cause of emergency room visits for people of all ages. Finding ways to increase access to information and evidence-based falls prevention strategies is critically important across the lifespan. We tested the feasibility of conducting a falls risk assessment and awareness program among customers who attend beauty salons. We enrolled 78 customers from 2 beauty salons who completed a written questionnaire as well as several biometric and functional balance tests designed to assess falls risk. On average, enrolled participants were 56 years of age (range: 19-90), female (n = 70, 91%), and Black (n = 47, 62%). Eleven percent of enrolled customers were classified as at high risk of falls because they had reported two or more falls in the last 6 months. We found that younger age, higher education, employment, moderate physical activity, and decreased frequency of salon visits were associated with fewer falls. RESULTS demonstrated initial interest in, and the feasibility of recruiting and enrolling customers into a beauty salon-based falls risk assessment and awareness program. Beauty salons, which are in all communities, represent an innovative setting for reaching people of all ages with life-saving falls prevention information and services.

PDF Y Endnote Y

Highly portable, sensor-based system for human fall monitoring

Mao A, Ma X, He Y, Luo J. *Sensors (Basel)* 2017; 17(9): s17092096.

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(Copyright © 2017, Multidisciplinary Digital Publishing Institute)

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Abstract

Falls are a very dangerous situation especially among elderly people, because they may lead to fractures, concussion, and other injuries. Without timely rescue, falls may even endanger their lives. The existing optical sensor-based fall monitoring systems have some disadvantages, such as limited monitoring range and inconvenience to carry for users. Furthermore, the fall detection system based only on an accelerometer often mistakenly determines some activities of daily living (ADL) as falls, leading to low accuracy in fall detection. We propose a human fall monitoring system consisting of a highly portable sensor unit including a triaxis accelerometer, a triaxis gyroscope, and a triaxis magnetometer, and a mobile phone. With the data from these sensors, we obtain the acceleration and Euler angle (yaw, pitch, and roll), which represents the orientation of the user's body. Then, a proposed fall detection algorithm was used to detect falls based on the acceleration and Euler angle. With this monitoring system, we design a series of simulated falls and ADL and conduct the experiment by placing the sensors on the shoulder, waist, and foot of the subjects. Through the experiment, we re-identify the threshold of acceleration for accurate fall detection and verify the best body location to place the sensors by comparing the detection performance on different body segments. We also compared this monitoring system with other similar works and found that better fall detection accuracy and portability can be achieved by our system.

PDF Y Endnote Y

Measurement of walking ground reactions in real-life environments: a systematic review of techniques and technologies

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Sensors (Basel) 2017; 17(9): s17092085.

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Abstract

Monitoring natural human gait in real-life environments is essential in many applications, including quantification of disease progression, monitoring the effects of treatment, and monitoring alteration of performance biomarkers in professional sports. Nevertheless, developing reliable and practical techniques and technologies necessary for continuous real-life monitoring of gait is still an open challenge. A systematic review of English-language articles from scientific databases including Scopus, ScienceDirect, Pubmed, IEEE Xplore, EBSCO and MEDLINE were carried out to analyse the 'accuracy' and 'practicality' of the current techniques and technologies for quantitative measurement of the tri-axial walking ground reactions outside the laboratory environment, and to highlight their strengths and shortcomings. In total, 679 relevant abstracts were identified, 54 full-text papers were included in the paper and the quantitative results of 17 papers were used for meta-analysis and comparison. Three classes of methods were reviewed: (1) methods based on measured kinematic data; (2) methods based on measured plantar pressure; and (3) methods based on direct measurement of ground reactions. It was found that all three classes of methods have competitive accuracy levels with methods based on direct measurement of the ground reactions showing highest accuracy while being least practical for long-term real-life measurement. On the other hand, methods that estimate ground reactions using measured body kinematics show highest practicality of the three classes of methods reviewed. Among the most prominent technical and technological challenges are: (1) reducing the size and price of tri-axial load-cells; (2) improving the accuracy of orientation measurement using IMUs; (3) minimizing the number and optimizing the location of required IMUs for kinematic measurement; (4) increasing the durability of pressure insole sensors, and (5) enhancing the robustness and versatility of the ground reactions estimation methods to include pathological gaits and natural variability of gait in real-life physical environment.

PDF Y Endnote Y

Quick foot placement adjustments during gait are less accurate in individuals with focal cerebellar lesions

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Gait Posture 2017; 58: 390-393.

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(Copyright © 2017, Elsevier Publishing)

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Abstract

Online gait corrections are frequently used to restore gait stability and prevent falling. They require shorter response times than voluntary movements which suggests that subcortical pathways contribute to the execution of online gait corrections. To evaluate the potential role of the cerebellum in these pathways we tested the hypotheses that online gait corrections would be less

accurate in individuals with focal cerebellar damage than in neurologically intact controls and that this difference would be more pronounced for shorter available response times and for short step gait corrections. We projected virtual stepping stones on an instrumented treadmill while some of the approaching stepping stones were shifted forward or backward, requiring participants to adjust their foot placement. Varying the timing of those shifts allowed us to address the effect of available response time on foot placement error. In agreement with our hypothesis, individuals with focal cerebellar lesions were less accurate in adjusting their foot placement in reaction to suddenly shifted stepping stones than neurologically intact controls. However, the cerebellar lesion group's foot placement error did not increase more with decreasing available response distance or for short step versus long step adjustments compared to the control group. Furthermore, foot placement error for the non-shifting stepping stones was also larger in the cerebellar lesion group as compared to the control group. Consequently, the reduced ability to accurately adjust foot placement during walking in individuals with focal cerebellar lesions appears to be a general movement control deficit, which could contribute to increased fall risk.

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Risk of falling in a stroke unit after acute stroke: the Fall Study of Gothenburg (FallsGOT)

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Clin. Rehabil. 2017; ePub(ePub): 269215517728325.

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(Copyright © 2017, Sage Publications)

DOI 10.1177/0269215517728325 **PMID**28891685

Abstract

OBJECTIVE: This study aimed to investigate incidence of falls and different baseline variables and their association with falling during hospitalization in a stroke unit among patients with acute stroke.

DESIGN: Prospective observational study.

SETTING: A stroke unit at a university hospital.

SUBJECTS: A consecutive sample of stroke patients, out of which 504 were included, while 101 declined participation.

METHODS: The patients were assessed a mean of 1.7 days after admission and 3.8 days after stroke onset.

MAIN MEASURES: The primary end-point was any fall, from admission to the stroke unit to discharge. Factors associated with falling were analysed using univariable and multivariable Cox hazard regression analyses. Independent variables were related to function, activity and participation, as well as personal and environmental factors.

RESULTS: In total, 65 patients (13%) fell at least once. Factors statistically significantly associated with falling in the multivariable analysis were male sex (hazard ratio (HR): 1.88, 95% confidence interval (CI): 1.13-3.14, $P = 0.015$), use of a walking aid (HR: 2.11, 95% CI: 1.24-3.60, $P = 0.006$) and postural control as assessed with the modified version of the Postural Assessment Scale for Stroke Patients (SwePASS). No association was found with age, cognition or stroke severity, the HR for low SwePASS scores (≤ 24) was 9.33 (95% CI: 2.19-39.78, $P = 0.003$) and for medium SwePASS scores (25-30) was 6.34 (95% CI: 1.46-27.51, $P = 0.014$), compared with high SwePASS scores (≥ 31).

CONCLUSION: Postural control, male sex and use of a walking aid are associated with falling during hospitalization after acute stroke.

PDF Y Endnote Y

Texting during stair negotiation and implications for fall risk

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Gait Posture 2017; 58: 409-414.

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(Copyright © 2017, Elsevier Publishing)

DOI 10.1016/j.gaitpost.2017.09.004 **PMID** 28898800

Abstract

BACKGROUND/AIM: Walking requires the integration of the sensory and motor systems. Cognitive distractions have been shown to interfere with negotiation of complex walking environments, especially in populations at greater risk for falls (e.g. the elderly). With the pervasiveness of mobile messaging and the recent introduction of augmented reality mobile gaming, it is increasingly important to understand how distraction associated with the simultaneous use of a mobile device impacts navigation of the complex walking environments experienced in daily life. In this study, we investigated how gait kinematics were altered when participants performed a texting task during step negotiation.

METHODS: Twenty participants (13 female, 7 males) performed a series of walking trials involving a step-deck obstacle, consisting of at least 3 texting trials and 3 non-texting trials.

RESULTS: When texting, participants ascended more slowly and demonstrated reduced dual-step foot toe clearance. Participants similarly descended more slowly when texting and demonstrated reduced single-step foot heel clearance as well as reduced dual-step foot fore-aft heel clearance.

CONCLUSION: These data support the conclusion that texting during stair negotiation results in changes to gait kinematics that may increase the potential for gait disruptions, falls, and injury. Further research should examine the effect texting has on performing other common complex locomotor tasks, actual fall risk, and the patterns of resulting injury rate and severity when negotiating complex environments.

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The comparison of ground reaction forces and lower limb muscles correlation and activation time delay between forward and backward walking

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(Copyright © 2017, Elsevier Publishing)

DOI 10.1016/j.gaitpost.2017.08.039 **PMID** 28888906

Abstract

This study aimed to compare the ground reaction forces (GRF) and lower limb muscles correlation and activation time delay between Forward (FW) and Backward (BW) walking. Twenty-four male students participated in this research. Electromyogram activities of gluteus medius, biceps femoris, medial gastrocnemius, soleus and anterior tibialis muscles along with GRFs were measured. Each

participant performed two FW and two BW trials bare foot. Statistical parametric mapping (SPM) analysis was performed over anterior-posterior and vertical GRFs time series. The paired t-test was used in SPM analysis. Cross-correlation analysis compared similarity in shape and time delay of EMG pattern. SPM analysis of GRFs showed that these two walking modes have asymmetrical kinetic behavior during most parts of stance phase. Based on cross-correlation analysis, the shape of EMG activation profiles differed, where a phase shift in the muscle activation pattern of approximately 60% occurred. This shift may indicate different control mechanisms, at the spinal level, underpin FW and BW walking modalities.

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PDF Y endnote Y

The effect of hearing aids and cochlear implants on balance during gait

Weaver TS, Shayman CS, Hullar TE.

Otol. Neurotol. 2017; 38(9): 1327-1332.

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DOI 10.1097/MAO.0000000000001551 **PMID** 28902805

Abstract

HYPOTHESIS: Auditory input in people with hearing impairment will improve balance while walking.

BACKGROUND: Auditory input is increasingly recognized as an additional input for balance. Several studies have found auditory cues to improve static balance measured on a sway platform. The effect of audition on gait, a dynamic task also linked to fall risk, has not been fully examined. If a positive effect were shown between audition and balance, it would further indicate that improving hearing could also improve balance.

METHODS: Inertial sensors quantified gait parameters of 13 bilateral hearing aid users and 12 bilateral cochlear implant (CI) users with their hearing devices on and off. Outcome measures included gait velocity, stride length variability, swing time variability, and double support phase.

RESULTS: Group analysis of each of the gait outcomes showed no significant differences between the aided and unaided conditions in both the hearing aid and CI groups. Gait velocity, an outcome most strongly linked to fall risk had 95% confidence interval differences of -2.16 to 1.52 and -1.45 to 4.17 cm/s in hearing aid and CI users, respectively (aided versus unaided condition). There was considerable variation among participants with some individuals improving in all four parameters.

CONCLUSION: The overall findings were not statistically significant, however, a small subset of our population improved clinically across several outcomes. This demonstrates that audition may have a clinically beneficial effect on balance in some patients.

PDF N Endnote Y

The effect of vitamin A on fracture risk: a meta-analysis of cohort studies

Zhang X, Zhang R, Moore JB, Wang Y, Yan H, Wu Y, Tan A, Fu J, Shen Z, Qin G, Li R, Chen G.

Int. J. Environ. Res. Public Health 2017; 14(9): e14091043.

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Abstract

This meta-analysis evaluated the influence of dietary intake and blood level of vitamin A (total vitamin A, retinol or β -carotene) on total and hip fracture risk. Cohort studies published before July 2017 were selected through English-language literature searches in several databases. Relative risk (RR) with corresponding 95% confidence interval (CI) was used to evaluate the risk. Heterogeneity was checked by Chi-square and I^2 test. Sensitivity analysis and publication bias were also performed. For the association between retinol intake and total fracture risk, we performed subgroup analysis by sex, region, case ascertainment, education level, age at menopause and vitamin D intake. R software was used to complete all statistical analyses. A total of 319,077 participants over the age of 20 years were included. Higher dietary intake of retinol and total vitamin A may slightly decrease total fracture risk (RR with 95% CI: 0.95 (0.91, 1.00) and 0.94 (0.88, 0.99), respectively), and increase hip fracture risk (RR with 95% CI: 1.40 (1.02, 1.91) and 1.29 (1.06, 1.57), respectively). Lower blood level of retinol may slightly increase total fracture risk (RR with 95% CI: 1.11 (0.94, 1.30)) and hip fracture risk (RR with 95% CI: 1.27 (1.05, 1.53)). In addition, higher β -carotene intake was weakly associated with the increased risk of total fracture (RR with 95% CI: 1.07 (0.97, 1.17)). Our data suggest that vitamin A intake and level may differentially influence the risks of total and hip fractures. Clinical trials are warranted to confirm these results and assess the clinical applicability.

PDF Endnote Y

The effects of constraining vision and eye movements on whole-body coordination during standing turns

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Exp. Brain Res. 2017; ePub(ePub): ePub.

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DOI 10.1007/s00221-017-5079-0 **PMID** 28884336

Abstract

Turning the body towards a new direction is normally achieved via a top-down synergy whereby gaze (eye direction in space) leads the upper body segments, which in turn lead the feet. These anticipatory eye movements are observable even in darkness and constraining the initial eye movements modifies the stereotyped top-down reorientation sequence. Our aim was to elucidate the relative contributions of vision and eye movements to whole-body coordination during large standing turns by observing the effects of separately removing visual information or suppressing eye movements throughout the turn. We predicted that constraining eye movements would modify the steering synergy, whereas removing vision would have little effect. We found that preventing eye movements modified both timing and spatial characteristics of axial segment and feet rotation. When gaze was fixed, gait initiation, but not axial segment rotation, was delayed in comparison to both full vision and no vision turns. When eye movements were prevented, the predictable relationship between the extent head rotation led the body and peak head angular velocity was abolished suggesting that anticipatory head movements normally subserve gaze behaviour. In addition, stepping frequency significantly reduced during the gaze fixation condition but not during the no-vision condition, suggesting that oculomotor control is linked to stepping behaviour.

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