Safety Literature 24th March 2024

Hearing loss, gait and balance impairments and falls among individuals with sub-acute stroke: a comparative cross-sectional study

Ademoyegun AB, Ogundiran O, Kayode AJ, Olaosun AO, Awotidebe TO, Mbada CE.
Heliyon 2024; 10(5): e26880.

DOI: 10.1016/j.heliyon.2024.e26880 **PMID**: 38486770 **PMCID**: PMC10937590

Abstract

BACKGROUND: The impact of hearing loss in stroke is less explored. This study aimed to compare hearing loss in patients with sub-acute stroke with healthy controls and evaluate its association with gait and balance impairments and falls.

METHODS: This study involved 78 ambulant sub-acute stroke patients and 78 age-sex-matched controls. Hearing loss was assessed with pure tone average, while gait and balance impairments were assessed with the Timed Up and Go test, Berg Balance Scale, Functional Gait Assessment and 10-m walk test (gait speed). Fall occurrence was evaluated by a self-report questionnaire.

RESULTS: The prevalence of hearing loss (pure tone average of >25 dB) was higher in stroke patients than in controls (64.1% vs. 35.9%; $p < 0.001$). The mean pure tone average of stroke patients showed a significant positive correlation with Timed Up and Go test ($r = 0.357$; $p = 0.001$) and fall occurrence ($r = 0.253$; $p = 0.025$), and a significant negative correlation with Berg Balance Scale ($r = -0.299$; $p = 0.008$) and Functional Gait Assessment ($r = -0.452$; $p < 0.001$). There was a non-significant negative correlation with gait speed ($r = -0.166$; $p = 0.147$). Multiple regression showed that mean pure tone average was associated with Timed Up and Go test (B = 0.096; 95%CI: 0.010, 0.183) and Functional Gait Assessment (B = -0.087; 95%CI: -0.157, -0.017), but not with gait speed (B = -0.003; 95%CI: -0.007, 0.001) and Berg Balance Scale (B = -0.058; 95%CI: -0.165, 0.049).

CONCLUSION: Hearing loss is more prevalent among patients with sub-acute stroke compared with age-sex-matched controls. Hearing loss is also associated with gait and balance impairments and falls among sub-acute stroke patients. We recommend that hearing screening and rehabilitation be incorporated into post-stroke rehabilitation programmes as part of strategies to improve balance and gait and reduce or prevent falls.

Language: en

Keywords: Ambulation; Cerebrovasular disease; Hearing impairment; Physical functioning; Postural control

Prevention and management of falls in adults: a best practice implementation project

Albertini ACS. Am. J. Nurs. 2024; 124(4): 46-47.

DOI: 10.1097/01.NAJ.0001010584.12599.84 **PMID**: 38511711

Abstract

[Abstract unavailable]

Language: en

Keywords: Adult; Humans

Developing community-level implementation networks to connect older adults to evidence-based falls prevention programs

Ashida S, Hellem A, Bucklin R, Carson MK, Casteel C. Health Promot. Pract. 2024; ePub(ePub): ePub.

DOI: 10.1177/15248399241237953 **PMID**: 38509756

Abstract

BACKGROUND: Evidence-based falls prevention programs are available in many communities, but participation in such programs remains low. This study aimed to develop community-based referral networks of organizations to facilitate the uptake of evidence-based falls prevention programs through engaging older adults at risk for falls with the RememberingWhen™ program and connecting them to evidence-based programs in Midwestern communities.

METHODS: Guided by the Practical, Robust Implementation and Sustainability Model (PRISM), referral networks were developed in two Midwestern communities (urban and micropolitan) through a seven-step community engagement plan: establishing and operationalizing the State-level Advisory Board (SAB), identifying falls prevention resources, conducting community assessments, developing Local Advisory Groups (LAG), operationalizing the LAG, developing referral network and protocols, and implementing the network. Semistructured interviews guided by the RE-AIM framework were conducted with members of the SAB, LAG, administrators and staff from organizations that participated in networks, and older adult participants.

RESULTS: After participating in the development of referral networks, participants felt they learned important skills that they can use to develop additional collaborations and networks in the future, emphasized the benefits of building community capacity among organizations with common missions. Interview data yielded strategies on enhancing the referral network's reach, impact, adoption, implementation efficiency, and maintenance.

CONCLUSION: Future sustainability studies of such networks should explore identified challenges and strategies to sustain efforts.

RESULTS highlight the importance of ongoing funds to support the efforts of organizational networks in communities.

Language: en

Keywords: community-based programs; community-engagement; falls prevention; implementation; organizations; referral network

Prevalence of osteoporosis, sarcopenia, and high falls risk in healthy community-dwelling Thai older adults: a nationwide cross-sectional study

Asavamongkolkul A, Adulkasem N, Chotiyarnwong P, Vanitcharoenkul E, Chandhanayingyong C, Laohaprasitiporn P, Soparat K, Unnanuntana A. JBMR Plus 2024; 8(2): ziad020.

DOI: 10.1093/jbmrpl/ziad020 **PMID**: 38505534 **PMCID**: PMC10945715

Abstract

Thailand has transitioned from an aging society to an aged society, which implies that the prevalence of age-related disorders will increase; however, epidemiological data specific to the prevalence of age-related degenerative musculoskeletal disorders among Thai older adults remain limited. Accordingly, the aim of this study was to investigate the prevalence of age-related musculoskeletal diseases, including osteoporosis, sarcopenia, and high falls risk among healthy community-dwelling Thai older adults. This cross-sectional nationwide study enrolled Thai adults aged ≥60 yr from 2 randomly selected provinces from each of the 6 regions of Thailand via stratified multistage sampling during March 2021 to August 2022. All enrolled participants were evaluated for BMD, skeletal muscle mass, grip strength, and gait speed. Osteoporosis was diagnosed according to the World Health Organization definition, and sarcopenia was diagnosed according to the Asian Working Group for Sarcopenia (AWGS) 2019 criteria. Falls risk was determined using the self-rated Fall Risk Questionnaire. A total of 2991 eligible participants were recruited. The mean age of participants was 69.2 ± 6.5 yr (range: 60-107), and 63.1% were female. The prevalence of osteoporosis, sarcopenia, and high falls risk was 29.7%, 18.1%, and 38.5%, respectively. Approximately one-fifth of subjects (19.1%) had at least 2 of 3 risk factors (ie, osteoporosis, sarcopenia, and high falls risk) for sustaining a fragility fracture, and 3.4% had all 3 risk factors. In conclusion, the results of this study revealed a high and increasing prevalence of osteoporosis, sarcopenia, and high falls risk in healthy community-dwelling Thai older adults. Since these conditions are all major risk factors for fragility fracture, modification of Thailand's national health care policy is urgently needed to address the increasing prevalence of these conditions among healthy community-dwelling older adults living in Thailand.

Language: en

Keywords: nationwide cross-sectional study; osteoporosis; osteosarcopenia; prevalence; sarcopenia

Motion analysis of balance pre and post sensorimotor exercises to enhance elderly mobility: a case study

Chen J, Romero R, Thompson LA. Appl. Sci. (Basel) 2023; 13(2): e889.

DOI: 10.3390/app13020889 **PMID**: 38501123 **PMCID**: PMC10947499

Abstract

Quantitative assessment of movement using motion capture provides insights on mobility which are not evident from clinical evaluation. Here, in older individuals that were healthy or had suffered a stroke, we aimed to investigate their balance in terms of changes in body kinematics and muscle activity. Our research question involved determining the effects on post- compared to pre-sensorimotor training exercises on maintaining or improving balance. Our research hypothesis was that training would improve the gait and balance by increasing joint angles and extensor muscle activities in lower extremities and spatiotemporal measures of stroke and elderly people. This manuscript describes a motion capture-based evaluation protocol to assess joint angles and spatiotemporal parameters (cadence, step length and walking speed), as well as major extensor and flexor muscle activities. We also conducted a case study on a healthy older participant (male, age, 65) and an older participant with chronic stroke (female, age, 55). Both participants performed a walking task along a path with a rectangular shape which included tandem walking forward, right side stepping, tandem walking backward, left side stepping to the starting location. For the stroke participant, the training improved the task completion time by 19 s. Her impaired left leg had improved step length (by 0.197 m) and cadence (by 10 steps/min) when walking forward, and cadence (by 12 steps/min) when walking backward. The non-impaired right leg improved cadence when walking forward (by 15 steps/min) and backward (by 27 steps/min). The joint range of motion (ROM) did not change in most cases. However, the ROM of the hip joint increased significantly by 5.8 degrees ($p = 0.019$) on the left leg side whereas the ROMs of hip joint and knee joint increased significantly by 4.1 degrees ($p = 0.046$) and 8.1 degrees ($p = 0.007$) on the right leg side during backward walking. For the healthy participant, the significant changes were only found in his right knee joint ROM having increased by 4.2 degrees ($p = 0.031$) and in his left ankle joint ROM having increased by 5.5 degrees ($p = 0.006$) during the left side stepping.

Language: en

Keywords: balance; elderly; evaluation protocol; falls; joint angle; muscle activities; sensorimotor training; spatiotemporal

Edge computing transformers for fall detection in older adults

Fernandez-Bermejo J, Martinez-Del-Rincon J, Dorado J, Toro XD, Santofimia MJ, Lopez JC. Int. J. Neural. Syst. 2024; ePub(ePub): ePub.

DOI: 10.1142/S0129065724500266 **PMID**: 38490957

Abstract

The global trend of increasing life expectancy introduces new challenges with far-reaching implications. Among these, the risk of falls among older adults is particularly significant, affecting individual health and the quality of life, and placing an additional burden on healthcare systems. Existing fall detection systems often have limitations, including delays due to continuous server communication, high false-positive rates, low adoption rates due to wearability and comfort issues, and high costs. In response to these challenges, this work presents a reliable, wearable, and cost-effective fall detection system. The proposed system consists of a fit-for-purpose device, with an embedded algorithm and an Inertial Measurement Unit (IMU), enabling real-time fall detection. The algorithm combines a Threshold-Based Algorithm (TBA) and a neural network with low number of parameters based on a Transformer architecture. This system demonstrates notable performance with 95.29% accuracy, 93.68% specificity, and 96.66% sensitivity, while only using a 0.38% of the trainable parameters used by the other approach.

Language: en

Keywords: deep learning; Fall detection; Inertial Measurement Unit; older adults; Self-Attention; Threshold-Based Algorithm; Transformer Neural Network

The influence of women's age and fall history on foot and lower limb kinematics during transition step descent

Gerstle EE, O'Connor K, Keenan KG, Slavens BA, Cobb SC. J. Biomech. 2024; 166: e112056.

DOI: 10.1016/j.jbiomech.2024.112056 **PMID**: 38513399

Abstract

Falls are a major public health concern, with older women being at the greatest risk to experience a fall. Step descent increases the likelihood of a fall injury, yet the influence of age and fall history on lower extremity kinematics have not been extensively studied. The purpose of this study was to examine lower extremity and foot kinematics of women with and without a fall history during single step descent. Hip, knee, and foot kinematics of young women (n = 15, age = 22.6 ± 3.2 years), older women with no recent falls (n = 15, age = 71.6 ± 4.4 years), and older women with a fall history (n = 15, age = 71.5 ± 5.0 years) as they descended a 17 cm step were examined. Differences in initial contact angles and ROM during landing were examined with between group MANOVA tests. Distal foot initial contact angles were not significant between groups. For range of motion, both older groups went through greater hip extension ($p = 0.003$, partial $\eta(2) = 0.25$), but less hip adduction ($p = 0.002$, partial $\eta(2) = 0.27$) and less lateral midfoot dorsiflexion ($p = 0.001$, partial $\eta(2) = 0.28$) than the younger women. The older fall group had reduced knee flexion ($p = 0.004$, partial $\eta(2) = 0.23$) than the younger group, and the older non-fallers slightly plantarflexed at the medial midfoot ($p = 0.005$, partial $\eta(2) = 0.23$) while the young women dorsiflexed. Thelanding phase ROMdifferences exhibited by the older adult groupsmayincrease the likelihood of a misstep, which may result in a fall.

Language: en

Keywords: Curb; Multi-segment foot model; Older adults; Stair descent

Chronic pain in older adults with disabilities is associated with fall-related injuries: a prospective cohort study

Honda H, Ashizawa R, Kameyama Y, Hirase T, Arizono S, Yoshimoto Y. Eur. Geriatr. Med. 2024; ePub(ePub): ePub.

DOI: 10.1007/s41999-024-00965-4 **PMID**: 38512605

Abstract

PURPOSE: Previous studies have shown an association between chronic pain and the occurrence of falls in community-dwelling older adults; however, the association between chronic pain and fall-related injuries in older adults with disabilities is unclear. This study aimed to determine the association between chronic pain and fall-related injuries in older adults with disabilities.

METHODS: This 24-month prospective cohort study included older adults aged 65 years or older using Japanese long-term care insurance services. Chronic pain, defined as "pain that has persisted for more than three months to date," was assessed using a face-to-face questionnaire. Fall-related injuries, defined as "injuries requiring hospitalization or outpatient treatment due to a fall," were assessed using a fall calendar. Data were analyzed using a Cox proportional hazards model, with fall-related injury as the dependent variable, chronic pain as the independent variable, and confounders as covariates.

RESULTS: Among 133 included participants, 15 experienced fall-related injuries. After adjusting for age and sex as covariates, chronic pain was significantly associated with fall-related injuries (hazard ratio: 5.487, 95% confidence interval: 1.211-24.853, p = 0.027).

CONCLUSIONS: Chronic pain was associated with fall-related injuries in older adults with disabilities. In this population, a greater focus should be placed on treating chronic pain to reduce the occurrence of falls.

Language: en

Keywords: Chronic pain; Disability; Fall-related injury; Older adults; Prospective study

Association between vision impairment and increased prevalence of falls in older US adults

Jin H, Zhou Y, Stagg BC, Ehrlich JR. J. Am. Geriatr. Soc. 2024; ePub(ePub): ePub.

DOI: 10.1111/jgs.18879 **PMID**: 38514075

Abstract

BACKGROUND: Vision impairment (VI) is associated with falls in older adults. However, past studies have relied on geographically constrained samples with limited generalizability or self-reports of visual difficulty. To date, there have not been nationally representative studies on the association of objective measures of visual function and falls outcomes.

METHODS: We used cross-sectional data from Round 11 of National Health and Aging Trends Study (NHATS), a nationally representative panel study of age-eligible Medicare beneficiaries (N = 2951). We performed Poisson regression to calculate the prevalence and prevalence ratio (PR) of >1 fall in the past year, any fall in the past month, fear of falling (FoF), and activity limitation due to FoF as a function of distance visual acuity, near visual acuity, and contrast sensitivity. Models were adjusted for demographic and health covariates and were weighted to make nationally representative parameter estimates.

RESULTS: The weighted proportion of participants with VI was 27.6% (95% CI, 25.4%-29.9%). Individuals with any VI had a higher prevalence of falls compared with those without VI (18.5% vs. 14.1%, PR = 1.25, 95% CI 1.02-1.53). Specifically, contrast sensitivity impairment was associated with a higher prevalence of recurrent falls (20.8% vs. 14.7%; PR = 1.30, 95% CI 1.01-1.67) and recent falls (17.1% vs. 9.9%; PR = 1.40, 95% CI 1.01-1.94). This relationship existed even independent of near and distance visual acuity. Distance and near visual acuity were not significantly associated with falls. Having any VI was also associated with a higher prevalence of FoF (38.4% vs. 30.5%, PR = 1.17, 95% CI 1.02-1.34).

CONCLUSION: The prevalence of falls is associated with poor contrast sensitivity but not with near or distance visual acuity.

FINDINGS suggest greater collaboration between geriatricians and eye care providers may be warranted to assess and address fall risk in older adults with VI.

Language: en

Keywords: contrast sensitivity; falls; fear of falling; NHATS; vision impairment

Effects of Taekkyon-based exercise program on balance, lower extremity strength, and gait parameters in community-dwelling older women: randomized controlled trial

Kim CY, Jeong HW, Baek CY, Kim SW, Kim HD. Medicine (Baltimore) 2024; 103(11): e37463.

DOI: 10.1097/MD.0000000000037463 **PMID**: 38489715

Abstract

BACKGROUND: As individuals age, they experience a decline in muscle strength and balance, leading to diminished functional capacity and an increased risk of falls. The purpose of the current study was to investigate the effects of the Taekkyon-based exercise program on balance, muscle strength, and gait ability in women aged over 65-year-old residing in the local community.

METHODS: Forty-eight subjects were randomly allocated into the Taekkyon-based exercise program as an experimental group (EG = 25; mean age: 71.68 ± 3.26) or a fall prevention program as a control group (CG = 23; mean age: 73.65 ± 5.88). EG participants received 1-hour Taekkyon exercise sessions twice a week for 12 consecutive weeks. CG participants received a typical fall prevention program. The measurements in each group included assessments of balance levels (the timed up-and-go test, one-leg stance, and functional reach test), lower extremity strength (the 5-chair stand test and 30-second chair stand test), and gait parameters (cadence, step length, step width, stride length, stride time, and gait velocity) before and after the intervention.

RESULTS: After the intervention, balance (timed up-and-go test, one-leg stance, and functional reach test), lower extremity strength (5-chair stand test and 30-second chair stand test), and gait parameters (cadence, stride time, and gait velocity) showed a significant improvement in EG participants compared to CG participants ($P < .05$). Compared to the normal value of balance ability and strength of elderly women over 65 years of age, most outcomes were greater than average normal values for those receiving Taekkyon exercise.

CONCLUSION: Taekkyon-based exercise program was more effective in improving balance, lower extremity strength, and gait capacity than the usual fall prevention program in elderly women over 65 years of age. Its effects can approach normal values for women in this age group. The 12-week Taekkyon-based exercise program could be useful as part of a fall prevention program to elderly people.

Language: en

Investigating balance-related gait patterns and their relationship with maximum torques generated by the hamstrings and quadriceps in older adults - results from the Baltimore Longitudinal Study of Aging

Ko SU, Jerome GJ, Simonsick EM, Ferrucci L. Arch. Gerontol. Geriatr. 2024; 123: e105411.

DOI: 10.1016/j.archger.2024.105411 **PMID**: 38493525

Abstract

BACKGROUND: Balance-related gait patterns in older adults can be objectively discerned through the examination of gait parameters, maximum leg torques, and their interconnections.

OBJECTIVE: To investigate the correlation between leg muscle strength and balance during gait concerning functional performance in healthy older adults.

METHODS: Participants included 117 adults aged 60-95 years were recruited from the Baltimore Longitudinal Study of Aging (BLSA). They underwent evaluations of gait, balance, and maximum isometric leg torque (for both hamstrings and quadriceps). Analyses examined the association between leg torque and functional performance among those with higher and lower balances.

RESULTS: Individuals with lower balance (n = 43) were older, more prone to experiencing a fear of falling, and exhibited lower functional performance (gait speeds and Generalized Gait Stability Scores (GGSS), ps < 0.001) compared to their counterparts with higher balance (n = 74). At a usual walking pace, the GGSS showed a positive association with concentric Quadriceps Maximum Torque (QMT) in participants with lower balance (p = 0.013). Conversely, it displayed a positive association with eccentric QMT in those with higher balance (p = 0.014). At a fast walking pace, only individuals with higher balance demonstrated a positive muscle torque association with both gait speed and GGSS, encompassing concentric and eccentric actions in both the quadriceps and hamstrings (ps < 0.050).

CONCLUSION: Evaluating muscle strength capacity in both concentric and eccentric phases during dynamic high-effort events, along with investigating their associations with gait performance, can be beneficial for identifying subtle gait deficits. This comprehensive approach may assist in the early detection of gait deterioration among healthy older adults, given the intricate muscle activations involved in lower body functional performance.

Language: en

Keywords: Efficiency in gait; Generalized gait stability score (GGSS); Hamstrings maximum torque (HMT); Lower balance; Quadriceps maximum torque (QMT)

Quantifying the external joint workload and safety of Latin dance in older adults: potential benefits for musculoskeletal health

Loría-Calderón TM, Gómez-Carmona CD, Santamaría-Guzmán KG, Rodríguez-Hernández M, Pino-Ortega J. Appl. Sci. (Basel) 2024; 14(7): e2689.

DOI: 10.3390/app14072689 **PMID**: unavailable

Abstract

As global aging rises, identifying strategies to mitigate age-related physical decline has become an urgent priority. Dance represents a promising exercise modality for older adults, yet few studies have quantified the external loads older dancers experience. This study aimed to characterize the impacts accumulated across lower limb and spinal locations in older adults during Latin dance. Thirty older Latin dancers (age = 66.56 ± 6.38 years; female = 93.3%) wore inertial sensors on the scapulae, lumbar spine, knees, and ankles during a 1 h class. A distal-to-proximal gradient emerged in the total impacts ($F = 429.29$; $p < 0.01$; $\omega p2 = 0.43$) and per intensities ($F = 103.94$-to-665.55; $p < 0.01$; $\omega p2 = 0.07$-to-0.54), with the highest impacts sustained in the ankles (≈9000 total impacts) from 2 g to >10 g ($p < 0.01$; $d = 1.03$-to-4.95; ankles > knees > lower back > scapulae) and knees (≈12,000 total impacts) when <2 g ($p < 0.01$, $d = 2.73$-to-3.25; knees > ankles > lower back > scapulae). The majority of the impacts remained below 6 g across all anatomical locations (>94%). The impacts also increased in lower limb locations with faster tempos ($r = 0.10$-to-0.52; $p < 0.01$), while subtly accumulating over successive songs rather than indicating fatigue ($r = 0.11$-to-0.35; $p < 0.01$). The mild ankle and knee loads could strengthen the dancers' lower extremity bones and muscles in a population vulnerable to sarcopenia, osteoporosis, and falls. Quantifying the workload via accelerometry enables creating personalized dance programs to empower healthy aging. With global aging rising, this work addresses a timely public health need regarding sustainable lifelong exercise for older people. Ranging from low to moderate, the measured impact magnitudes suggest that dance lessons may provide enough osteogenic stimulus without overloading structures.

Language: en

Keywords: accelerometry; exercise prescription; inertial sensors; injury prevention; older adults

Editorial: Balance-controlling mechanism and fall-prevention strategy

Ma CZH, Zhu RTL, Huang M, Lee WCC, Yang Y, He C. Front. Neurol. 2024; 15: e1385917.

DOI: 10.3389/fneur.2024.1385917 **PMID**: 38504798 **PMCID**: PMC10949366

Abstract

Editorial on the Research Topic

Balance-controlling mechanism and fall-prevention strategy

Falls and fall-related injuries and deaths burden society heavily. Balance and gait disorders are the primary cause of falls in older adults. Currently, evidence-based training regimens are still lacking for some populations with a specific balance disorder, which calls for high-quality interventional studies to facilitate clinical practices. In addition, tackling the challenges of fall prevention demands more in-depth investigations of balance-control mechanisms, which may facilitate the more sensitive assessment of balance impairment and possibly the earlier detection of fall risks. These mechanisms are also expected to provide insights for the earlier, more targeted, and more effective fall-prevention management. We are happy to have published 9 articles in this research topic that advance our understanding of the balance-control mechanisms (He et al.; Jiang et al.; Sato et al.; Xing et al.; Santos et al.; Caronni et al.) and the latest evidence-based fall-prevention management (Xing et al.; Winser et al.; Ho et al.; Elrod et al.).

Language: en

Keywords: balance; fall prevention; fall risk; falls; neurology; posture; rehabilitation

Generalization of in-place balance perturbation training in people with Parkinson disease

Monaghan AS, Hooyman A, Dibble LE, Mehta SH, Peterson DS. J. Neurol. Phys. Ther. 2024; ePub(ePub): ePub.

DOI: 10.1097/NPT.0000000000000471 **PMID**: 38489661

Abstract

BACKGROUND AND PURPOSE: Reactive balance training improves reactive postural control in people with Parkinson disease (PwPD). However, the extent to which reactive balance training generalizes to a novel, unpracticed reactive balance task is unknown. This study aimed to determine whether reactive training stepping through support surface translations can be generalized to an unpracticed, instrumented tether-release task.

METHODS: Twenty-five PwPD (70.52 years ± 7.15; Hoehn and Yahr range 1-3) completed a multiple baseline, open-label, uncontrolled pre-post intervention study. Stepping was trained through a 2-week (6-session) intervention with repeated support surface translations. Performance on an untrained tether-release task (generalization task) was measured at 2 baseline assessments (B1 and B2, 2 weeks apart), immediately after the intervention (P1), and 2 months after training (P2). The tether-release task outcomes were the anterior-posterior margin of stability (MOS), step length, and step latency during backward and forward steps.

RESULTS: After support surface translation practice, tether-release stepping performance improved in MOS, step length, and step latency for both backward and forward steps compared to baseline ($P < 0.05$). Improvements in MOS and step length during backward and forward steps in the tether-release task, respectively, were related to stepping changes in the practiced task. However, the improvements in the generalization task were not retained for 2 months.

DISCUSSION AND CONCLUSIONS: These findings support short-term generalization from trained balance tasks to novel, untrained tasks. These findings contribute to our understanding of the effects and generalization of reactive step training in PwPD. Video Abstract available for more insights from the authors (see the Video, Supplemental Digital Content available at http://links.lww.com/JNPT/A465).

Language: en

Body composition, balance, functional capacity and falls in older women

Nordling Y, Sund R, Sirola J, Kröger H, Isanejad M, Rikkonen T. Aging Clin. Exp. Res. 2024; 36(1): e76.

DOI: 10.1007/s40520-024-02719-5 **PMID**: 38512411

Abstract

BACKGROUND: The aim of this study was to examine the association of body composition, muscle strength, balance, and functional capacity on falls and fall injuries among community-dwelling older women.

METHODS: The study comprised of a 2-year randomized controlled trial involving 914 women with an average age of 76.5 (SD = 3.3) years at baseline. The women were assigned to exercise intervention (n = 457) and control groups (n = 457). Clinical measurements were conducted at baseline, 12 months and 24 months.

RESULTS: During the 2-year follow up, total of 546 women (59.7%) sustained a fall. The total number of falls was 1380 and out of these, 550 (40%) of falls were non-injurious and 745 (54%) were injurious. Higher femoral neck bone mineral density (BMD) was associated with a higher overall risk of falls [RR = 2.55 (95% CI = 1.70-3.84, $p < 0.001$)], but was a protective factor for severe fall injuries [RR = 0.03 (95% CI = 0.003-0.035, $p < 0.01$)]. Slower Timed Up and Go (TUG) was associated with an increased overall risk of falls [RR = 1.07 (95% CI = 1.05-1.10, $p < 0.001$)] and injuries requiring medical attention [RR = 1.10 (95% CI = 1.02-1.19, $p = 0.02$)]. Longer single leg standing time was a protective factor for falls [RR = 0.99 (95% CI = 0.99-1.00, $p < 0.01$)] and overall injurious falls [RR = 0.99 (95% CI = 0.99-1.00, $p = 0.02$)].

CONCLUSION: For postmenopausal women with higher femoral neck BMD appear to sustain more falls, but have a lower risk of severe fall injuries. Better TUG and single leg standing time predict lower risk of falls and fall injuries.

Language: en

Keywords: Balance; Body composition; Falls; Functional capacity; Injuries; Postmenopausal women

Virtual reality exergames for improving physical function, cognition and depression among older nursing home residents: a systematic review and meta-analysis

Peng Y, Wang Y, Zhang L, Zhang Y, Sha L, Dong J, He Y. Geriatr. Nurs. 2024; 57: 31-44.

DOI: 10.1016/j.gerinurse.2024.02.032 **PMID**: 38503146

Abstract

OBJECTIVE: To explore the effectiveness of virtual reality (VR) exergames on physical function, cognition and depression among older nursing home residents.

METHODS: A systematic review and meta-analysis were conducted. The PubMed, Ovid, Embase, Cochrane, CINAHL, and Web of Science databases were searched for relevant studies from inception until June 1, 2023. The reviewers independently completed the study selection, data extraction and quality assessment. Subgroup analyses were conducted to explore the sources of between-study heterogeneity and to determine whether participant or intervention characteristics influenced effect sizes.

RESULTS: Eighteen studies met the inclusion criteria and were selected for qualitative and quantitative synthesis. The overall methodological quality was relatively high, and the overall evidence grade was moderate. VR exergames had a large effect on physical function, including mobility [SMD=-0.66, $P < 0.001$], balance [SMD=0.95, $P < 0.001$], and lower limb strength [SMD=0.53, $P = 0.0009$]; and a moderate effect on cognition [SMD=0.48, $P = 0.02$] and depression [SMD=-0.72, $P = 0.03$]. Subgroup analyses revealed that a training frequency of 2 sessions per week and coordinating with physiotherapists yielded greater improvements in mobility ($P = 0.009$; $P = 0.0001$). VR exergames had especially beneficial effects on balance for physically fit participants ($P = 0.03$) and on cognition for participants with cognitive impairment ($P = 0.01$). Additionally, regarding the improvement of depression, commercial VR exergames were superior to self-made systems ($P = 0.03$).

CONCLUSION: VR exergames can provide a positive impact on physical function, cognition and depression among older nursing home residents. The study also demonstrated the different benefits of exergames between participants who were physically fit and those with cognitive impairment, which is considered as an innovative, cost-efficient and sustainable approach. Specifically, commercial VR exergame programs with a frequency of 2 sessions per week and coordinating with physiotherapists may be the most appropriate and effective option.

Language: en

Keywords: Cognition; Depression; Nursing home; Older adults; Physical function; VR interventions

The mediating effect of nutrition on oral frailty and fall risk in community-dwelling elderly people

Song H, Wei Y, Wang Y, Zhang J. BMC Geriatr. 2024; 24(1): e273.

DOI: 10.1186/s12877-024-04889-3 **PMID**: 38504156

Abstract

BACKGROUND: Population aging is accelerating, particularly in Asian countries. Falls are the leading cause of unintentional injuries in the elderly over 60 years old in China. Hence, it is crucial to anticipate the risk factors associated with fall risk. We aimed to explore whether oral frailty and fall risk were reciprocally related and whether nutrition mediated their association.

METHODS: From October 2022 to March 2023, a total of 409 elderly individuals from the Yangzhou community were selected using the convenience sampling method. Cross-sectional data on older adults' oral frailty, nutrition, and fall risk were collected using questionnaires. Data analysis was performed using SPSS 27.0 and PROCESS macro.

RESULTS: The fall risk score was 1.0 (ranging from 0 to 4.0), with 107 cases (26.2%) identified as being at risk of falling. Spearman correlation analysis revealed a positive correlation between oral frailty and the risk of falls ($rs = 0.430$, $P < 0.01$). Nutrition was found to have a negative correlation with both oral frailty and fall risk (rs=-0.519、-0.457, $P < 0.01$). When controlling for covariates, it was observed that nutrition mediated the relationship between oral frailty and falls. The mediating effect value accounted for 48.8% of the total effect ($P < 0.01$).

CONCLUSIONS: Oral frailty was significantly associated with fall risk, and nutrition might be a mediating factor for adverse effects of oral frailty and fall risk. Enhancing the nutrition of older individuals is a vital approach to mitigating fall risk among those with oral frailty.

Language: en

Keywords: Community elderly; Fall risk; Mediation analysis; Nutrition; Oral frailty

Improvement of postural control in the frail older adults through foot care: a pre- and post-intervention study

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Abstract

Frailty in older adults often leads to foot issues, increasing fall-related fracture risk. Mechanoreceptors, the pressure receptors in the foot sole, are pivotal for postural control. Foot problems can impair mechanoreceptor function, compromising balance. This study aimed to examine the effect of foot care on postural control in frail older adults. Forty-eight participants underwent a five-month monthly foot care intervention. Measurements were taken before and after this intervention. Participants stood for 45 s in a static, open-eyed position on a stabilometer. Center-of-pressure (CoP) analysis included total trajectory length, integrated triangle area, rectangular area, and range of motion in anterior-posterior and medio-lateral directions.

RESULTS indicated that foot care significantly increased toe ground contact area by 1.3 times and improved anterior-posterior motion control during static standing. Enhanced postural control resulted from improved skin condition due to foot care that intensified mechanoreceptor signal input and improved postural control output. These findings underscore the potential for reducing fracture risks in older adults through proactive foot care. The study highlights the vital role of foot care in enhancing postural control, with broader implications for aging population well-being and safety.

Language: en

Keywords: Center-of-pressure; Foot care; Frail older adults; Mechanoreceptors; Postural control