



## POSTER ABSTRACTS

anterior muscles. After receiving a familiarization trial, subjects performed the reactive balance task without a cognitive task (ST-balance) and while performing an alphanumeric cognitive task (DT). The cognitive task was also performed while standing (ST-cognition). The number of correct responses on the cognitive task was recorded. Results: The compensatory step length significantly reduced ( $p < 0.05$ ) and reaction time significantly increased in DT compared to ST-balance conditions ( $p < 0.05$ ). Peak COM displacement significantly increased in DT compared to ST-balance conditions. Further, the number of correct responses on the alphanumeric cognitive task also declined in DT compared to ST-cognition condition ( $p < 0.05$ ). Conclusions: The deterioration of both motor and cognitive variables under DT conditions supported our hypothesis that reactive responses to large real-life like perturbations require attentional resources. These responses therefore, might involve higher order planning and co-ordination processes. It is suggested that pre-occupying attentional resources with an additional cognitive task could potentially interfere with the cortex's ability to provide feedback for timely and appropriate recovery response initiation and execution-hence predisposing an individual to an increased risk of falling. Considering the attentional demands of reactive balance tasks, fall-prevention interventions should focus on simultaneous cognitive-balance training under more challenging environmental conditions.

### **P1-K-48      Age-related differences in the control of weight-shifting within the surface of support**

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**BACKGROUND AND AIM:** An important reason for falling in elderly is incorrect weight-shifting<sup>1</sup>. In many daily life activities quick and accurate weight-shifting is needed to maintain balance, especially in situations when balance is suddenly disturbed and anticipation on the upcoming movement is difficult. Considering the deterioration in postural control in elderly<sup>2</sup>, it is expected that they have more difficulties with executing these quick and accurate weight-transfers<sup>3</sup>. The present study aims to gain more insight in age-related differences in postural control strategies during a postural control task requiring weight-transfers of different amplitudes and in different directions within the surface of support. **METHODS:** Nine healthy older adults (70.3±6.9 years) and twelve young adults (20.9±0.5 years) participated in the study. The participants performed a weight-shifting task by moving the whole body in different directions to move a cursor, representing real time COP position, towards targets of different sizes and at different distances projected on a screen. Movement time (MT) was the time between the appearance of the goal target and the moment a target switch was realized (i.e. the cursor stayed in the goal target for 0.5 second). The accuracy of the movement was quantified by Counts on Goal (CoG), that is the number of times the cursor hit the goal target before a target switch was realized and by Dwelling Time (DT), the time required to realize a target switch after the goal target was hit by the cursor for the first time. Fluency was expressed by the maximal deviation (MD) of the performed path with respect to the ideal path and the number of peaks (nP), or inflections in the performed path. **RESULTS:** Significant main effects of target size, target distance and age on all outcome measures were found ( $p < 0.01$ ). With decreasing target size, increasing target distance and increasing age, MT significantly increased and fluency and accuracy significantly decreased (nP, MD, CoG and DT increased). Elderly used a slower, less accurate and less fluent weight-shifting strategy compared to younger adults with increasing task



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difficulty (e.g. decreasing target size and increasing target distance) as indicated by significant interaction effects of size\*age and distance\*age ( $p < .05$ ). CONCLUSION: The results of this study provided insight in how elderly control their weight-shifting when the movement cannot be anticipatorily planned. Elderly exhibited slower and more variable movements, especially with increasing task difficulty. This weight-shifting strategy seems characterizing for an increased fall risk in elderly, since the results indicate that elderly might have more difficulties with executing an adequate (quick and accurate) adaptation to a perturbation in daily life. <sup>1</sup>SN Robinovitch et al. Lancet. (2013), 381(9860), 47-54. <sup>2</sup>FB Horak. Age Ageing. (2006), 35(2), 7-11. <sup>3</sup>V Jongman et al. Stud Health Technol Inform. (2012), 181, 93-97.

### **P1-K-49      Slow Gait, Mild Cognitive Impairment and Fall: Obu Study of Health Promotion for the Elderly**

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Background and aim: Gait slowing is linked to be worsening with cognitive impairment such as dementia and preceded to even MCI, considered as a clinical signature that the prodromal phase of Alzheimer disease (AD), most types of dementia. The deficits of gait and cognition may contribute to disabling forms of fall or dementia. However, the association of combination status of slow gait speed with MCI, cognitive function and fall were not investigated among a large cohort study with fully sample. To examine whether combination status of slow gait and MCI associate with cognitive functions and fall in community-dwelling older people. Methods: Participants (n = 3400) from Obu Study of Health Promotion for the Elderly underwent gait examination and neuropsychological examinations, and interviewed a series of questionnaires including fall history. Results: Participants were classified as healthy control (N = 2281), slow gait speed (SG, N = 278), MCI (N = 673) and MCI with SG (MCI+SG, N = 168) groups. All of cognitive functions were significantly affected by group factor even adjusted for subjects' characteristics as covariates ( $p < .001$ ). Post-hoc analysis showed that control group had better performances than any other groups and MCI+SG group had worse performances than any other groups in all of cognitive functions (all  $p < .05$ ). In multiple logistic regression analysis, status of SG and MCI was independently associated with fall ( $p < .05$ ) and MCI+SG had higher odds ratio against fall (adjusted OR: 1.99 [95%CI: 1.08-3.65]). Conclusions: Our findings support the idea that slow gait speed had impact on cognitive function separately from MCI. Combined slow gait speed and MCI had strongly affected cognitive function in comprehensive domains and associated with fall.

### **P1-K-50      Failure to clear stationary, visible obstacles is affected by surface characteristics**

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BACKGROUND AND AIM: Previous research has examined the changes in gait characteristics as a function of environmental manipulations and related these changes to trip risk. These studies describe gait characteristics of the successful trials. To fully describe the risk of tripping, it is important to also examine the unsuccessful trials when the subject's foot contacts the obstacle (failures). Heijnen et al. (2012) examined failures and found that foot elevation progressively decreased with each trial (slope -