

Age effects on postural reaction time and coordination during voluntary sway movements

Tucker, M¹, Kavanagh, J¹, Morrison, S^{1,2}

¹ *School of Physiotherapy and Exercise Science, Griffith University, Gold Coast, Australia*

² *Applied Cognitive Neuroscience Research Centre, Griffith University, Gold Coast, Australia*

The aim of this study was to examine age-related changes in reaction time and the pattern of coordination between the centre of pressure (COP) and accelerations of the head and trunk during a challenging postural task. Ten young (24 ± 5 yr), and eight healthy older men (75 ± 2 yr) stood on a force plate with 3D accelerometers fastened to the head and trunk. The task goal was to voluntarily execute an orthogonal switch of standing body sway between AP and ML directions as rapidly as possible in response to an auditory cue. The results were that older subjects exhibited increased reaction time, meaning that older subjects were slower to initiate a rapid switch of postural sway between the AP and ML directions. Older individuals also exhibited stronger in-phase relations between the COP, trunk and head compared to the young during the postural responses. The stronger coupling between the COP, trunk and head in older subjects indicates that they adopted a more rigid posture than the young. This freezing of degrees of freedom in addition to the slower reaction time suggests that the elderly sacrificed speed of response to maintain an increased perception of postural stability. For the elderly, the loss of functional degrees of freedom through increasing body stiffness coupled with the slower response times would seem to be detrimental to maintaining optimal postural stability and may have implications for falls risk in this cohort.