Age Differences for Attentional Focus Effects in a Function of a Rapid Single Step to Regain Balance During a Forward Fall

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Purpose: The purpose of this study was to clarify the influence of age-related differences on attentional focus effects in the reaction time and the movement pattern of the involuntary front single step.

Methods: Eight healthy elderly women and eight healthy young men were released from a forward-leaning position and instructed to regain standing balance by taking a single step forward. The involuntary step was induced while carrying out three cognitive tasks: 1) simple front-fixed gaze as control condition; 2) Color word reading as displayed every one sec; and 3) Color word reading as a word is displayed in a color different from the color it actually names. This task is called stroop task. Lower extremity spatiotemporal parameters, foot-floor reaction time, and thigh muscle activity were measured during the step responses.

Results: The delay of foot-floor reaction time and the increase of knee extension muscle activity after the step landing were found only in the elderly stroop task compared with control task. The step length and step velocity were significantly decreased in the elderly in comparison with the young subjects, but there was no difference among the cognitive tasks.

Conclusion: In the elderly, a delay in the fall prevention step reaction after tripping is predicted when the elderly is distracted by attention-demanding tasks. This study also shows that there is no change in step movement velocity for a step delay.