Effects of visual focus and gait speed on walking balance in the frontal plane

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ABSTRACT

We investigated how head position and gait speed influenced frontal plane balance responses to external perturbations during gait. Thirteen healthy participants walked on a treadmill at three different gait speeds. Visual conditions included either focus downward on lower extremities and walking surface only or focus forward on a stationary scene with horizontal and vertical lines. The treadmill was positioned on a platform that was stationary (non-perturbed) or moving in a pattern that appeared random to the subjects (perturbed). In non-perturbed walking, medial–lateral upper body motion was very similar between visual conditions. However, in perturbed walking, there was significantly less body motion when focus was on the stationary visual scene, suggesting visual feedback of stationary vertical and horizontal cues are particularly important when balance is challenged. Sensitivity of body motion to perturbations was significantly decreased by increasing gait speed, suggesting that faster walking was less sensitive to frontal plane perturbations. Finally, our use of external perturbations supported the idea that certain differences in balance control mechanisms can only be detected in more challenging situations, which is an important consideration for approaches to investigating sensory contribution to balance during gait.

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