Analyzing the Effect of Affect on Gait

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Background: Falls pose a significant threat to aging individuals, requiring effective interventions. Strategies like medical alert systems, lifestyle changes, and balance training programs have been developed to mitigate fall-related injuries[1], however, these strategies neglect to consider the contribution of emotional state to fall risk. This is important because age-related cognitive decline impairs a person's ability to process external stimuli[2] and emotions induce a cognitive load on the brain[3]. Therefore, processing emotions can increase an older person's fall risk. There has been some research into the effect of emotions on posture and balance[4], however, they mainly focused on discrete emotions like fear, anger, or contentment, making consistent emotional experiences across subjects difficult. Instead, by studying the emotional state of a person using a dimensional model of emotions[5], an element of objectivity can be added, accounting for this error.

Objective: This study aims to analyze the relationship between gait, arousal, and valence to fully explore the effects of emotions on fall risk. By investigating the intricate relationship between emotional states and fall risk, this study will contribute valuable insights for the development of targeted fall prevention interventions.

Experimental Design: Participants will view a custom designed virtual reality environment that manipulates their valence and arousal levels. Then, participants will be immersed in the same virtual reality environment and asked to walk along an instrumented mat that will measure their gait. Valence will be assessed using facial electromyography from the zygomaticus major and corrugator supercilii muscles, and arousal will be measured through heart rate.

Hypothesis: We hypothesize that increasing arousal heightens cognitive load, leading to higher fall risk, while decreasing valence elevates cognitive load and fall risk.

References:

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