How does emotional state affect 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, 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 and emotions induce a cognitive load on the brain. 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, however, they mainly focused on discrete emotions like fear, anger, or contentment, making consistent emotional experiences across subjects difficult. Instead, studying the emotional state of a person using a dimensional model of emotions, an element of objectivity can be added, accounting for this error. A study that examines the relationship between emotional state and fall risk is missing from literature and would aid in future research.

Objectives
This study aims to analyze the relationship between gait, arousal, and valence to extract valuable insights for the development of targeted fall prevention interventions. 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
1. Induce emotional states with virtual environments
2. Evaluate emotional states with physiological measures
3. Immerse participant in virtual environment
4. Evaluate gait using instrumented mat

Measurements
- **Valence:** Facial electromyography of the corrugator supercili and zygomaticus major muscles
- **Arousal:** Heart rate collected via the Polar H10 chest strap heart rate monitor
- **Gait:** Step length and step time variability and walking velocity collected using an instrumented mat

Hypotheses
- Arousal
- Cognitive Load
- Fall Risk

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References