Performance under Pressure: Linking Change in Gait and Cognition

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- Cognitive processes (such as updating) are compromised when dual-tasks require high demand for cognitive resources.
- Time for older adults to initiate crossing the street increased to almost twice that of young adults while talking on a cell phone (Neider et al., 2011).
- Change in gait is correlated with brain changes in older adults.
- Increase in step length variability associated with subclinical infarcts and white matter abnormalities, including those in the basal ganglia (Rosano et al., 2007).
- Central nervous system (CNS) and peripheral nervous system (PNS) play a role in gait change, with PNS more influential in healthy young adults.
- Gait variability increases with impairment of CNS (e.g., dementia, Parkinson’s disease) or overloading of CNS by PNS/locomotor system (e.g. stress, obesity, joint pain) (see Figure 1).
- Protracted stress can impair the metabolic system, thereby increasing the risk of metabolic syndromes and overloading CNS (Lupien et al., 2007).

REFERENCES

RESULTS

1. Does dividing attention influence select gait characteristics in a young population?
2. How are these same gait characteristics linked to cognitive function?
3. Do stress or sleep further moderate the time-varying covariations between gait and cognition?

1. Does dividing attention influence select gait characteristics in a young population?
   - Verbal IQ, executive attention, and memory were related to gait characteristics measured for two walking conditions (walk only; walk + words) include:
     - Normalized velocity (NV): velocity adjusted for leg length
     - Step length (SL): distance between heel contact points of left and right feet
     - Step width (SW): distance between line of progression and opposite heel contact

DISE and sleep hours further moderated the effect between MSIT RT (int.) and select gait characteristics (NV, SL, and SW).
   - One unit increase in DISE score weakened the relationship between change in gait and change in cognition.
   - In contrast, a one unit increase in sleep hours strengthened the time-varying covariation between gait and cognition.

OBJECTIVES
1. Does dividing attention influence select gait characteristics in a young population?
2. How are these same gait characteristics linked to cognitive function?
3. Do stress or sleep further moderate the time-varying covariations between gait and cognition?

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