



US DEPARTMENT OF DEFENSE

BLAST INJURY RESEARCH PROGRAM COORDINATING OFFICE

Extremity Injury Management

Associations Between Trunk Postural Control in Walking and Unstable Sitting

Targeted training of trunk postural control (TPC) via isolated trunk control tasks may improve performance in activities like walking. To explore this relationship, researchers at the DoD/Department of Veterans Affairs (VA) Extremity Trauma and Amputation Center of Excellence (EACE) investigated TPC responses to perturbations during walking and sitting at multiple levels of demand (Acasio *et al.*, 2018).

Participants with no recent history of illness, injury, or musculoskeletal disorders were included in the study ($n = 13$). The test conditions included walking on a treadmill at speeds ranging 20 percent above and below a self-selected walking speed and sitting in an unstable chair at 100, 75, 60, and 45 percent of each participant's neutral stability.

Local TPC (i.e., resistance to continuous perturbations) was characterized through tri-planar Lyapunov exponents and sample entropy. Global TPC (i.e., response to finite perturbations) was measured by ranges of motion and, for seated trials, metrics derived from center-of-pressure time series.

There were no significant correlations between local TPC and the difficulty of test conditions during either walking or unstable sitting tasks. In contrast, global TPC declined with increasing task demand for both walking and unstable sitting, and there was a moderate inter-task relationship. This suggests global TPC may be similarly regulated in walking and sitting tasks, which supports the theory that improving TPC in one activity may translate to improvements in TPC during other.

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REFERENCES:

Acasio, J. C., Butowicz, C. M., Golyski, P. R., Nussbaum, M. A., & Hendershot, B. D. (2018). Associations between trunk postural control in walking and unstable sitting at various levels of task demand. *J Biomech*, 75, 181-185. doi:10.1016/j.jbiomech.2018.05.006

