

TITLE: The Effect of Baseline Neurocognition on Running Biomechanics: Implications for Running Performance and Injury Risk

FACULTY MENTOR NAME, EMAIL PHONE NUMBER: Daniel Herman MD, PhD, hermadc@ortho.ufl.edu, 352-273-7355; Heather Vincent PhD, vincehk@ortho.ufl.edu, 352-273-7459

FACULTY MENTOR DEPARTMENT: Orthopaedics and Rehabilitation, Human Dynamics Laboratory

RESEARCH PROJECT DESCRIPTION: Recent studies have demonstrated that low levels of neurocognitive function may have a negative effect on biomechanical performance during athletic tasks which may potentially increase the risk of musculoskeletal injury. This may particularly be the case during tasks with increased cognitive demands, such as during a task requiring attentional focus on multiple items. While running is commonly performed in conditions with different elements competing for attentional focus (e.g. running in a city environment, running while listening to music or a running partner), the effect of such conditions on running biomechanics has not been studied. The hypothesis of this study is that runners with lower levels of neurocognitive function will demonstrate worse biomechanical performance during dual-attention running tasks. The study will assess neurocognitive function of subjects using a battery of neurocognitive tests (Test of Visual Attention, Trailmaking A&B, Queued Stroop, Auditory Oddball Detection, Reaction Time) followed by an assessment of running biomechanics using 3D videography and an instrumented treadmill to obtain running kinetic and kinematic data. The treadmill running will occur in three different conditions: normal running, and during the complete of both a visual and auditory Continuous Performance Task. Biomechanical data such as stride length, stride frequency, center of mass displacement, vertical ground reaction force, and knee adduction moment will be compared across conditions and correlated with neurocognitive testing results. The medical student will be responsible for subject recruitment, obtaining subject consent, data collection, assisting with data analysis, and writing resulting manuscript(s) with the guidance of the mentors. Additional opportunities within the laboratory may be available for exception mentees on an as time-allows basis.

References:

Swanik CB, Covassin T, Stearne DJ, Schatz P. The relationship between neurocognitive function and noncontact anterior cruciate ligament injuries. *Am J Sports Med.* 2007 Jun;35(6):943-8.

Lee H, Sullivan SJ, Schneiders AG. The use of the dual-task paradigm in detecting gait performance deficits following a sports-related concussion: a systematic review and meta-analysis. *J Sci Med Sport.* 2013 Jan;16(1):2-7