Neural correlates of cognitive motor integration performance and concussion history in female varsity athletes

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While increased attention to concussion has brought increased awareness of its incidence and potential lasting cognitive and physical repercussions, there is still much that we do not understand physiologically¹. This doctoral line of research will examine two aspects of sport-related concussion. Because of known sex-related differences in the neural control of movement and concussion experience, these initial studies will focus on female athletes. One aspect will look at the utility of using cognitive-motor integration (CMI) assessment (i.e., thinking and moving at the same time, often required in sport) to detect lingering deficits beyond self-reported symptoms⁴, potentially serving as a predictor of future concussion risk. This research question arises from recent studies showing a disconnection between an athlete’s self-reported symptoms and neurocognitive testing¹ measures¹-³. A second study will examine the neural underpinnings to the cognitive-motor behavioural deficits observed in athletes with a history of concussion⁴. Specifically, different aspects of the movement control network function will be assessed in relation to an athletes’ cognitive-motor integration performance using resting state functional magnetic resonance imaging. Analyses will examine the impact of concussion history on the relationships between complex skilled movement performance and large-scale brain network function. These studies will provide insight into the neurological effects of brain injury on rule-based movement control, and the utility of this type of enhanced skill assessment to predict injury risk in young athletes.