Behavioural and neural correlates of concussion history and their ability to predict injury risk in varsity athletes. Alanna Pierias

Concussions are a common injury often found among athletes. In recent years, this injury has been brought to light because of the potential repercussions; however, there is much surrounding the injury that we still do not understand. Concussions are a form of mild traumatic brain injury which show no obvious structural damage, yet may leave lasting cognitive and physical dysfunctions. Recent studies have shown that there is a disconnection between the athlete’s self-reported symptoms and neurocognitive testing measures, as athletes typically rate themselves as symptom-free even when unable to pass the neurocognitive functioning test. Specifically, cognitive-motor integration (CMI) has been used to detect lingering deficits beyond self-reported symptoms. Additionally, little is known regarding the neural causes of these behavioural difficulties, and the impact of sex on impact, diagnoses, and recovery. This study aims to add to current literature on by investigating the underlying functional network activity associated with CMI task performance scores, and whether performance on a CMI task can predict an increased risk of sustaining a concussion or other injury, with a focus on sex-related differences, with the hopes of furthering our understanding of the impact of concussions on brain function, and increasing specificity of diagnoses and care.

CMI is required when performing rule-based eye-hand coordination tasks; therefore I will be utilizing a computer software program in which participants must perform both a direct (eye and hand to same target) and non-direct (eye/hand decoupled) visuomotor task in conjunction with imaging technology to measure resting state functional magnetic resonance imaging (fMRI). Data will be collected from varsity athletes. Analyses will compare asymptomatic athletes with a history of concussion to those without.

Preliminary results show no correlation between performance on our CMI task and resting state network activity; which may suggest a resilience in the female athlete brain. Additionally, it appears that males and females with a concussion history exhibit different difficulties in performance on a CMI task, but no difference is seen between males and females without a concussion history. These preliminary results will be taken into account when looking at whether CMI can predict an increased risk of sustaining a concussion or other injury.


