

Youth with a recent history of concussion display significantly reduced functional connectivity (FPN-Amygdala) compared to controls

# Brain Disruptions in Youth with Concussion Using the Adolescent Brain Cognitive Development Archival Dataset

Sheldrake, E., Wheeler, A.L., Goldstein, B.I., Reed, N., & Scratch, S.E.

## Background

**Concussion:** A traumatic brain injury induced by **biomechanical forces**, resulting in somatic, cognitive, and/or psychological impairments<sup>1</sup>

- Youth are particularly **vulnerable** to concussion, as brain development is ongoing<sup>2</sup>
- Concussion is associated with **mental health** problems, but **directionality** remains unknown<sup>3</sup>

**Objective:** To examine **psychological outcomes**, characterized by emotional and behavioural profiles, and **brain function** in youth with a recent history of concussion, in comparison to youth with anxiety disorders and age- and sex-matched comparison youth

## Methods

- (1) Examine between-group differences in **(A)** emotional and behavioural profiles (internalizing and externalizing t-scores from the Child Behaviour Checklist), and **(B)** brain function (functional connectivity via frontoparietal network (FPN) and amygdala correlations)
- (2) Examine if brain function predicted emotional and behavioural profiles, and determine any between-group effects

Archival data was collected at follow-up year 2, when all participants were 12 years old

	Concussion (Study Group)	Anxiety (Control Group 1)	Matched (Control Group 2)
Identification	Ohio State University TBI Identification Method	Kiddie Schedule for Affective Disorders and Schizophrenia	Medical History Questionnaire
Count (n)	108	117	108
% Male	67.5	47.2	67.5

## Results

- Significant differences were observed amongst **all groups** for emotional and behavioural profiles (Figure 1)
- Only youth with **anxiety** disorders displayed a **clinically relevant** score (>63 internalizing t-score; Figure 1)
- Functional connectivity was significantly **lower in youth with concussion** compared to control groups (Figure 2)
- Functional connectivity did **not** significantly predict emotional or behavioural profiles in any groups

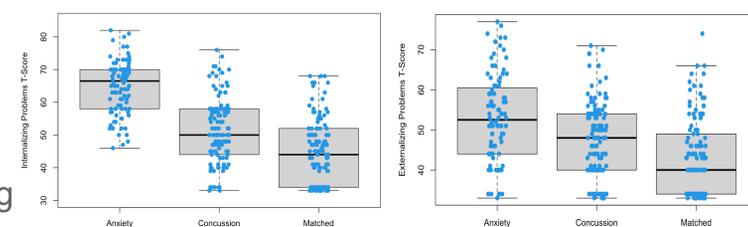


Figure 1: Emotional (Internalizing) and Behavioural (Externalizing) Profile t-Score Boxplots

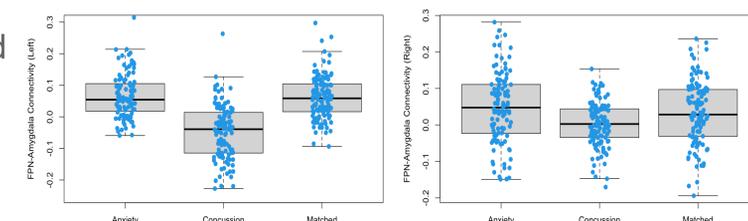


Figure 2: Functional Connectivity (FPN-Amygdala Left/Right Hemisphere) Boxplots

## Discussion

- Emotional profiles, characterized by internalizing problems, such as anxiety and depression, are elevated in youth with concussion compared to matched youth
- Future research should include cognitive measures to determine if a link between cognition and brain function
- Other brain networks and regions should be investigated, identify a brain-emotion/behaviour relationship that facilitate clinical decision-making for concussion

