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Changes in Emotional and Behavior Problems, and Brain Morphometry Following Mild Traumatic Brain Injury in Early Adolescence: A Pre-Post Study Design

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Introduction

Mild traumatic brain injury (mTBI)
- Highly prevalent in children
- Emotional & behavioral difficulties [1]

Interaction btw injury physiopathology & brain maturation may underpin long-term difficulties following mTBI [2]

Very few neuroimaging studies - conflicting results [2]
- ↓ gray matter volumes and cortical thickness following pediatric mTBI
- No changes

Unsolved question: differences already existed before the injury?
- Adolescent Brain Cognitive Development (ABCD) [3] - rare opportunity to explore it

Objective

To examine longitudinal changes in emotional and behavior problems, and brain morphometry in young adolescents with and without mTBI using a pre-post study design

Method

Measures

ABCD dataset
- Release 4.0
- Baseline & 2-year follow-up

Parent’s retrospective report of mTBI
- Parent Ohio State Traumatic Brain Injury Screen-Short Modified [4, 5]

Emotional and behavioral problems

Volume and Cortical thickness
- Pre-processed and quality checked T1-w MRI data (FreeSurfer 5.3) [7]
- Right & left hemisphere total volumes and mean cortical thickness in Desikan atlas [8]
- Scanner effects (n = 24) corrected before statistical analyses - longitudinal ComBat [9]

Statistical analyses

Longitudinal changes modeling
- Two-group Latent Change Score Model [10]

- Covariates: child sex and parental education
- lavaan 0.6-12 package [11], R version 4.1.2

Group (mTBI versus controls) differences
- 4 parameters of interest: mean & variance of the baseline & change scores
- Chi-square difference tests [10]

Results

Emotional and behavioral problems

<table>
<thead>
<tr>
<th>Controls</th>
<th>mTBI*</th>
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<tbody>
<tr>
<td>45-50</td>
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<tr>
<td>46</td>
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Total volumes

<table>
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<tr>
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<tbody>
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<td>265-270</td>
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Mean cortical thickness

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<td>2.72</td>
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<td>2.62</td>
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References