Changes in emotional and behavior problems, and brain morphometry following mild traumatic brain injury in early adolescence: A pre-post study design

Fanny Dégeilh, Tilmann von Soest, Lia Ferschmann, Christian K Tamnes

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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

CONCLUSION

As compared to non-injured peers, children with mTBI show no different profiles in emotional and behavior problems, but greater global brain volume and cortical thickness at baseline. Further exploration is needed to fully understand these findings.

METHODS

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]

RESULTS

Emotional and behavioral problems

<table>
<thead>
<tr>
<th></th>
<th>Controls (N = 6,780)</th>
<th>mTBI* (N = 145)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internalizing</td>
<td>49 (10 ± 0.6 years)</td>
<td>50 (10 ± 0.6 years)</td>
</tr>
<tr>
<td>Externalizing</td>
<td>46 (10 ± 0.6 years)</td>
<td>47 (10 ± 0.6 years)</td>
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</table>

Total volumes

<table>
<thead>
<tr>
<th></th>
<th>Left</th>
<th>Right</th>
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<tbody>
<tr>
<td>Volume  (mL)</td>
<td>265</td>
<td>260</td>
</tr>
<tr>
<td>Baseline</td>
<td>2-year</td>
<td></td>
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Mean cortical thickness

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<tbody>
<tr>
<td>Thickness (mm)</td>
<td>2,72</td>
<td>2,67</td>
</tr>
<tr>
<td>Baseline</td>
<td>2-year</td>
<td></td>
</tr>
</tbody>
</table>

Participants

ABCD Dataset Release 4.0 (N = 11,876)

Non eligible
- TBI before the study N = 457
- Head or neck injury N = 2,621
- No TBI information N = 1,440

Eligible participants (N = 7,354)

Excluded
- No imaging data N = 80
- Insufficient T1w quality N = 15
- Imbalanced scanner N = 324
- Missing predictors N = 10

Final sample (N = 6,925)

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References


https://team.inria.fr/empenn/fanny-degeilh

fanny.degeilh@inria.fr