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► To cite this version:

Fanny Dégeilh, Tilmann von Soest, Lia Ferschmann, Christian K Tamnes. Changes in emotional and behavior problems, and brain morphometry following mild traumatic brain injury in early adolescence: A pre-post study design. Flux Congress 2022, Sep 2022, Paris, France. inserm-03777498

HAL Id: inserm-03777498

<https://inserm.hal.science/inserm-03777498v1>

Submitted on 14 Sep 2022

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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**

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.

REFERENCES

[1] Catroppa et al., 2015; [2] King et al., 2019 ; [3] Casey et al., 2018; [4] Bogner et al., 2017; [5] Barch et al., 2018; [6] Achenbach and Rescorla, 2001; [7] Hagler et al., 2019; [8] Desikan et al., 2006; [9] Beer et al. 2020; [10] Kievit et al., 2018; [11] Rosseel, 2012

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

- Child Behavior Checklist-Parent (CBCL) [6] internalizing & externalizing problem t-scores

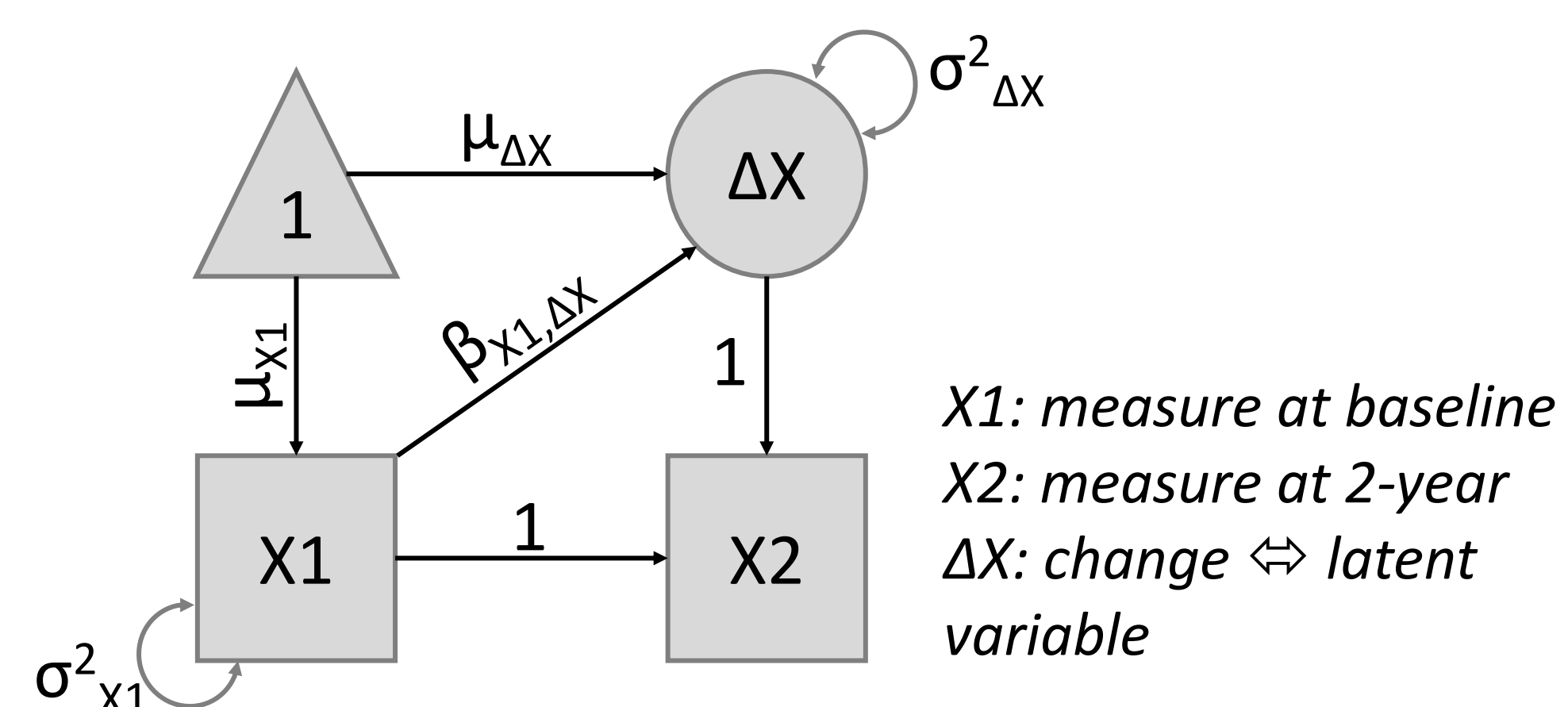
Volume and Cortical thickness

- 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]

PARTICIPANTS

ABCD Dataset Release 4.0 (N = 11,876)

Non eligible	TBI before the study N = 457	No TBI information N = 1,440
	Head or neck injury N = 2,621	Moderate or severe TBI N = 4

Eligible participants (N = 7,354)

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

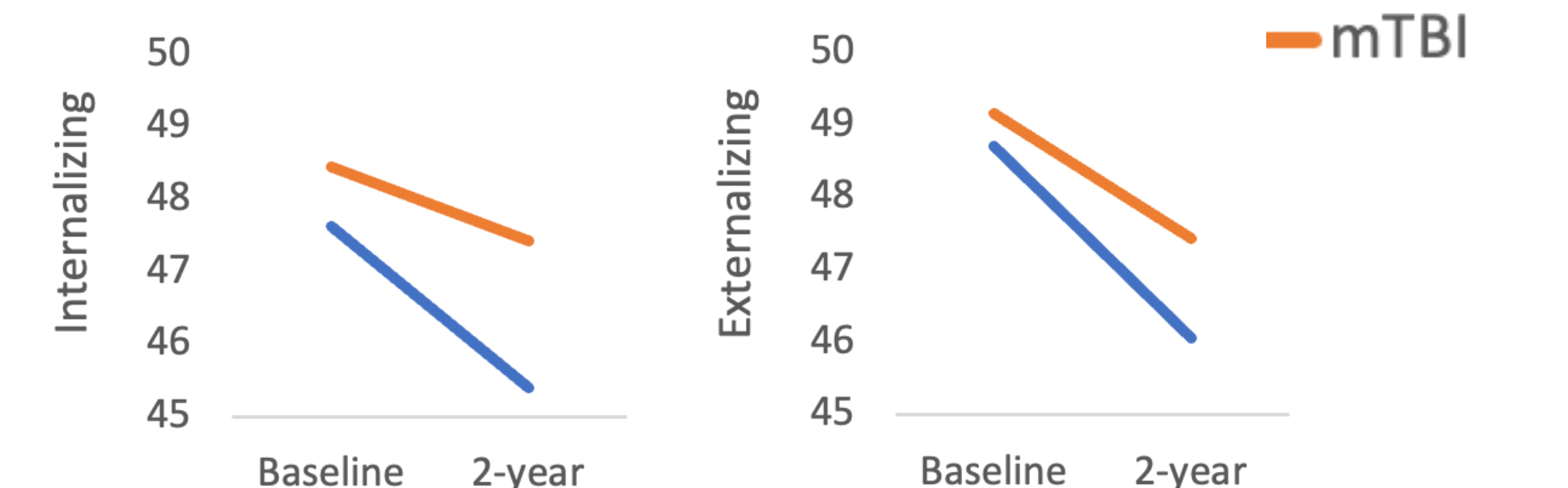
Final sample (N = 6,925)

Controls (N = 6,780) 3,309 [49%] ♂; 10 ± 0.6 years	mTBI* (N = 145) 86 [59%] ♂; 10 ± 0.6 years
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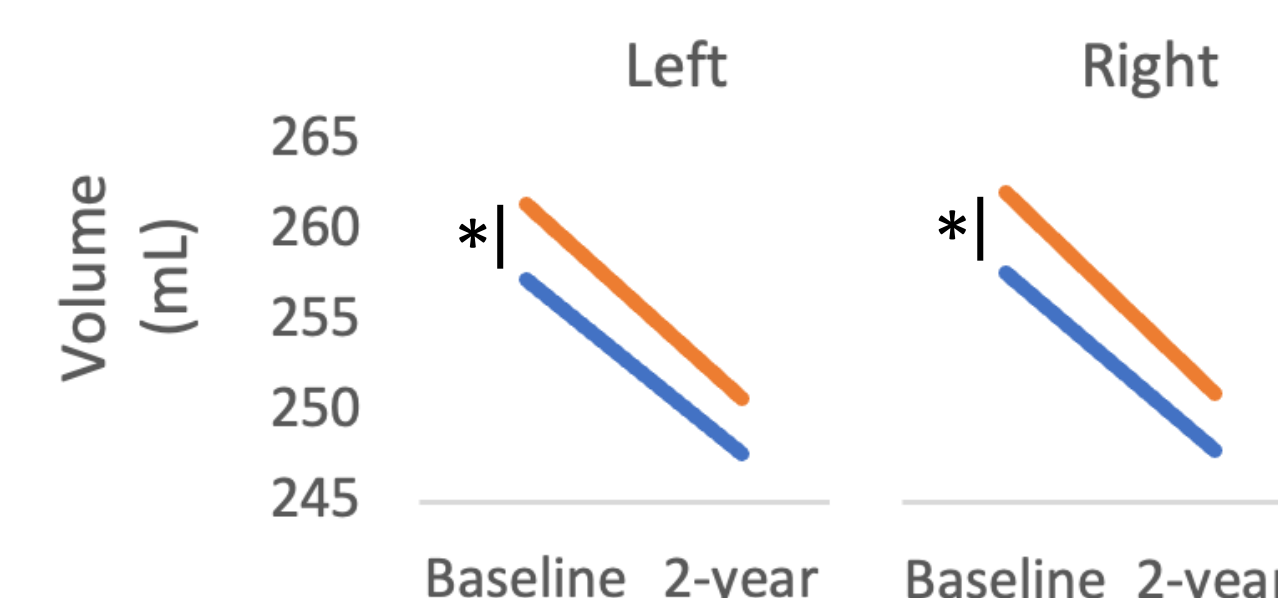
*mTBI with loss of consciousness ≤ 30 min or memory loss

RESULTS

Emotional and behavioral problems



Total volumes



Mean cortical thickness

