



Examining associations between stressful life events and hippocampal subfield volumes using the ABCD cohort

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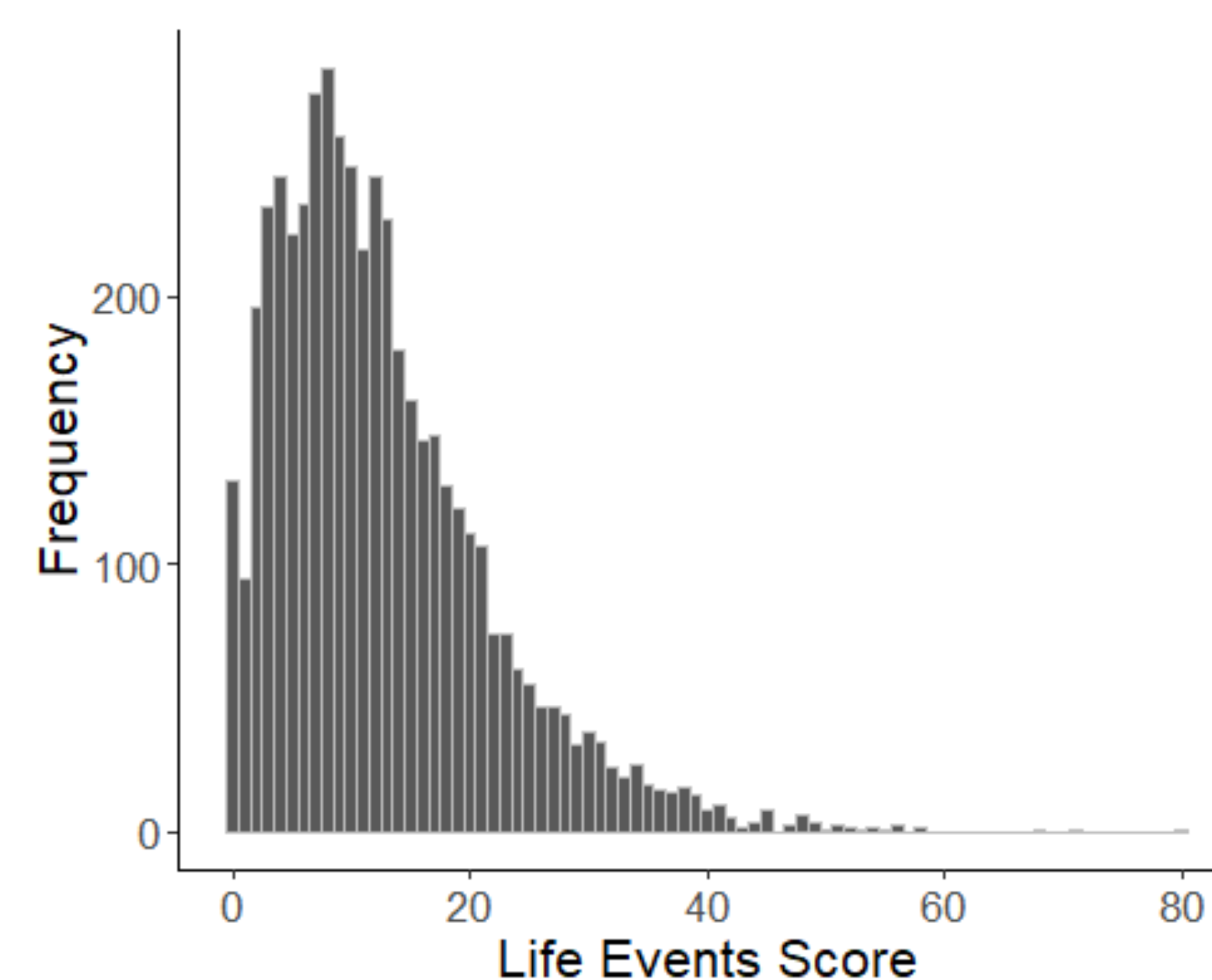
Neurocognitive Development Lab

Introduction

- The hippocampus is a stress sensitive brain region. Stress experienced during childhood relates to smaller hippocampal volumes in adults (Calem et al., 2017), but findings in children are mixed (e.g., Luby et al., 2013; Mehta et al., 2009).
- Studies often consider the hippocampus as a homogeneous structure (i.e., total hippocampal volume), which may mask important associations (e.g., Mehta et al., 2009). Examining subfields of the hippocampus may help to provide clarity.
- Research Question:** How do stressful life events relate to hippocampal subfield volumes in a large sample of adolescents?

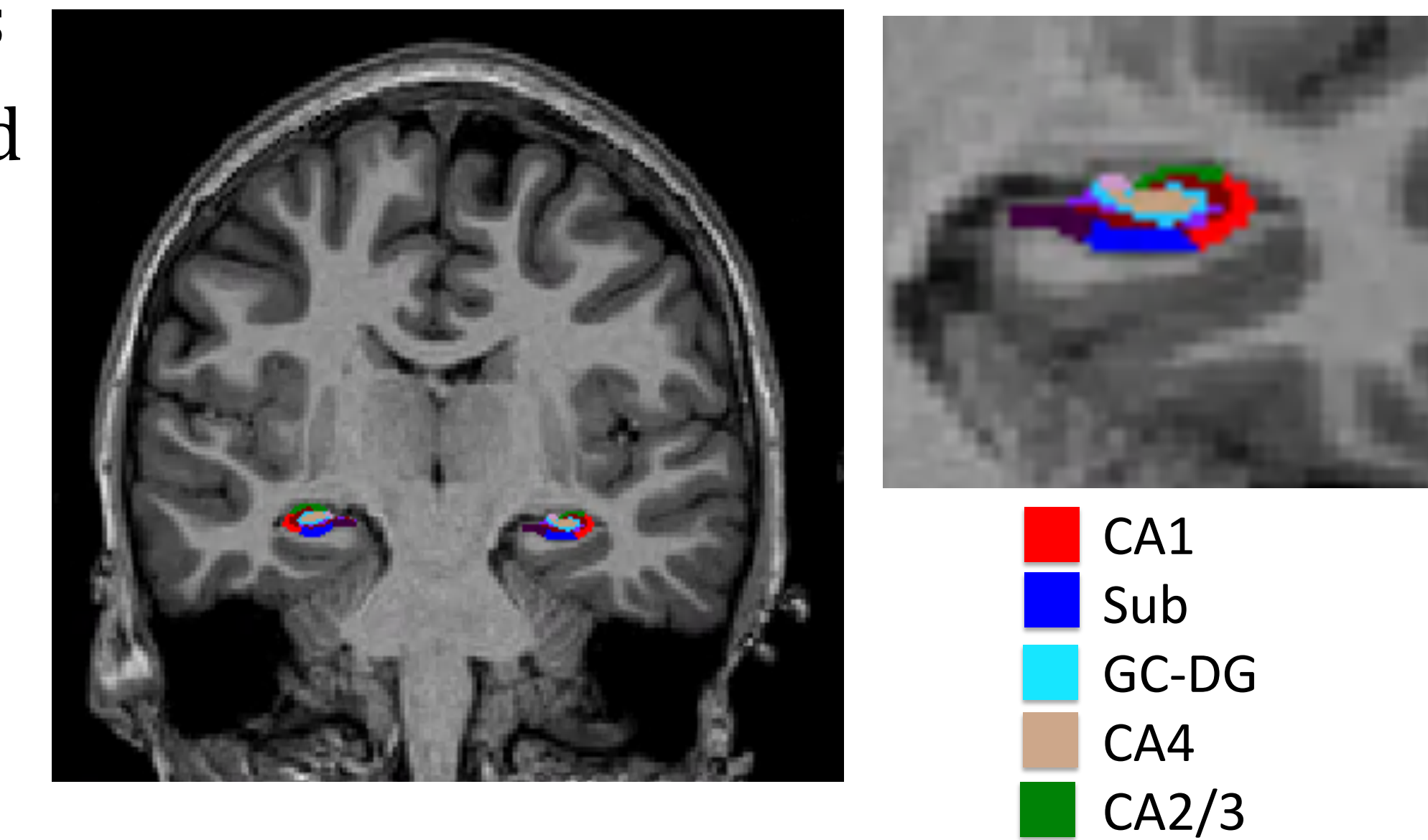
Methods: Life Events Scale

- Data came from the Adolescent Brain Cognitive Development Study (ABCD; Volkow et al., 2018)
- N = 4,950 (2,370 females) 9- to 10-year old adolescents who completed the Life Events Scale
- Parent education was obtained from the Parent Demographics Survey to assess whether results vary by socioeconomic status (SES)
- Life Events Scale**
 - Adolescents were asked about 22 negative life events (e.g., someone in the family died) that may have occurred in their life
 - Did event occur (yes/no)? How much did event affect you (0 = Not at All; 1 = A Little; 2 = Some; 3 = A lot)?
 - Cumulative Number of Events** ($M = 4.95, SD = 3.15$; range = 0 - 23)
 - Cumulative Effect of Events** ($M = 7.67, SD = 6.43$; range = 0 - 57)
 - Life Events Score** ($M = 12.98, SD = 9.09$; range = 1 - 80)
 - Life Events Score = Cumulative Number of Events + Cumulative Effect of Events



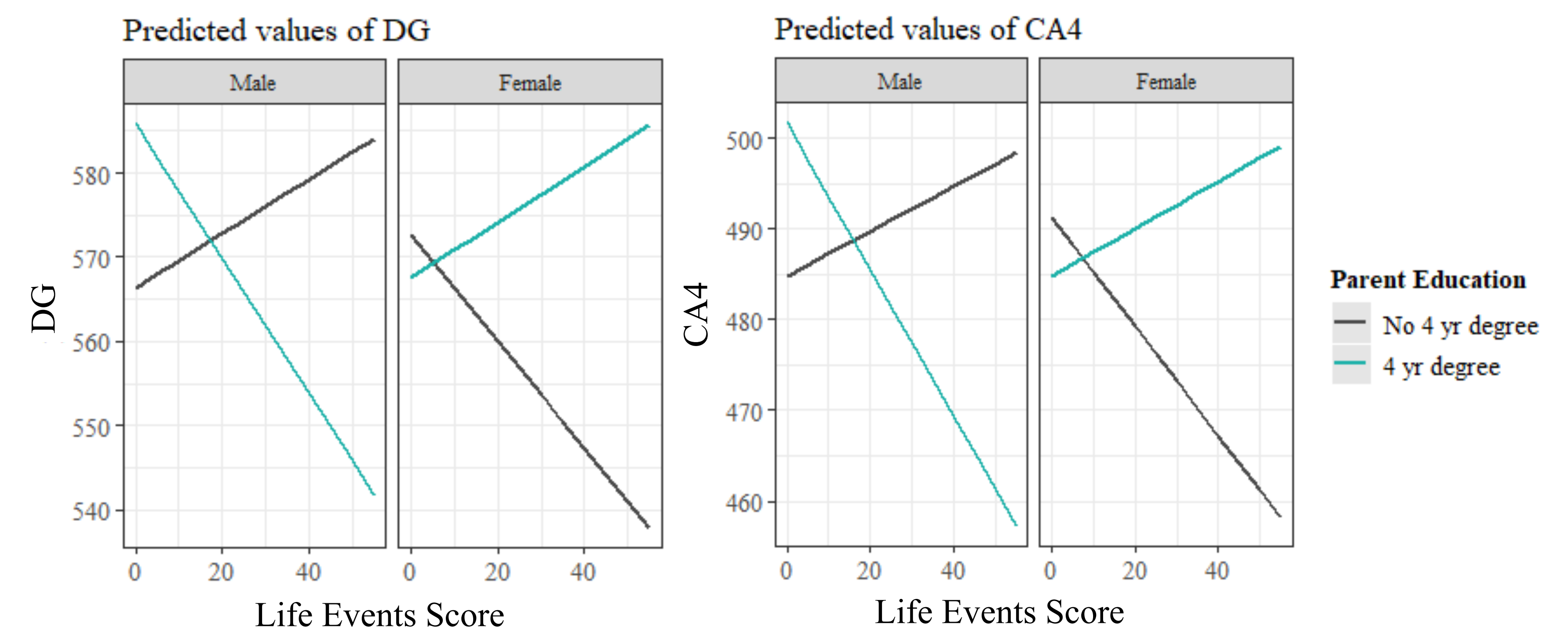
Methods: MRI Data

- Subsample of 380 subjects processed for preliminary analyses
- Processed using T1-weighted high resolution and T2-weighted scans (1mm^3)
- Freesurfer 7.1 was used to extract subfield volumes using the "FS360" parcellation.
 - Subfields: cornu ammonis (CA1, CA3, CA4), dentate gyrus (DG), & subiculum (Sub)
 - Collapsed across hemisphere and subregion



Results

- Analyzed using measured variable path analysis in Mplus
- Covariates:** Age; Intracranial volume (ICV); Scanner type
- DVs:** CA1, CA3, CA4, DG, Sub
- IVs:** Life Events Score; Sex; SES (parent education); 2-way and 3-way interactions between Life Events Score, Sex, and SES
- Significant 3-way Life Events Score X Sex X SES interaction predicting DG ($b = .086, SE = .045, p < .05$) and CA4 volumes ($b = .096, SE = .044, p < .03$).



Discussion

- Preliminary results suggest that DG and CA4 are particularly impacted by the stress associated with negative life events.
- Results also suggest that negative life events may impact hippocampal subfield volumes differently in males and females. These associations may also vary by SES.
- Future analyses will include the full sample of adolescents and will also examine associations with behavioral outcomes (i.e., memory) given the importance of the hippocampus for memory.

Acknowledgements

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For questions or comments, please contact mbotdorf@terpmail.umd.edu