Associations between attachment security and hippocampal and amygdala volumes in early childhood
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Introduction
• Early childhood experiences of parental sensitivity and attachment security are critical for healthy development and predict a range of emotional, social, and biological outcomes (Thompson, 2016).
• Research on brain structure and caregiving has shown that the development of the amygdala and hippocampus may be impacted by severe negative parenting (e.g., early deprivation and neglect; Belsky & De Haan, 2011; Nelson et al., 2011).
• Researchers are just beginning to look at the role that normative variation in caregiving experiences may play on the developing brain in both children and adults. However, results have been conflicting thus far (Bernier, Calkins, & Bell, 2016; Moutsiana et al., 2015).
• Building on research examining early attachment with adult brain structure (e.g., Moutsiana et al., 2015), we present exploratory data investigating the relation between attachment security and hippocampal and amygdala volumes in early childhood.

Methods: MRI Data Collection
• One week later, children returned to the lab for an MRI scan.
• T1-weighted high resolution (1mm³) anatomical images were acquired from a Siemens 3T scanner with a 32-channel coil at the Maryland Neuroimaging Center using a standard structural MRI scan sequence (MPRAGE).
• Hippocampal, Amygdala, and Whole Brain Volume Extraction

Participants
• 65 children aged 5-8 years (M = 6.03, SD = 1.09 years, 35 females) completed the study.
• Participants were part of a larger study examining the development of episodic memory in early childhood.

Young Child Security Scale
• Participants completed a modified version of the Security Scale, a self-report questionnaire of children’s attachment to their caregiver (Kerns, Klepac, & Cole, 1996).
• Given the young age of our sample, the scale was shortened to 6 items and divided into behavioral and beliefs subscales. All analyses focus on the behavioral subscale.
• Items were read aloud by an experimenter and children responded verbally to each item using a graphic aid.
• Responses were scored on a 4-point scale, with 1 indicating lower security and 4 indicating higher security. A Security Score for each subscale was derived by taking the mean response across the 3 items for each subscale.
• Scores were split dichotomously to create secure (scores ranging from 1.00-2.99) and insecure (scores ranging from 3.00-4.00) attachment groups.

Discussion
• Results do not provide support for a relation between normative variations in attachment security and hippocampal and amygdala volume.
• Based on our results and the conflicting literature, it is possible that only extreme negative parenting and not normal variation in parenting contributes to differences in brain development.
• Additionally, differences in brain development may not emerge until adolescence when the brain is already undergoing a great deal of change.
• Future studies should also consider the role of other variables, such as age, gender, and SES, when investigating relations between attachment security and brain structure.
• Finally, the lack of relation could be due to the adapted measure that was used. Future research should explore other measures that may be better suited to young children along with behavioral measures of attachment to investigate this relation.

Results: Brain-Behavior Data
• 47 participants were in the secure attachment group and 18 participants were in the insecure attachment group.
• Though these are unequal sample sizes, they match the typical sizes, they match the typical recommendations for study power.
• Two equivalent one-way ANOVAs were conducted to determine whether there was an effect of secure vs. insecure attachment on total hippocampal volume or total amygdala volume.
• Results did not suggest a significant effect of attachment security on hippocampal volume, F(1, 63) = 0.40, p = 0.53, or amygdala volume, F(1, 63) = 0.55, p = 0.46.
• Analyses were also run for bilateral (left, right) and subregion (head, body, tail) hippocampal volumes and bilateral amygdala volumes, but no significant effects were found, all ps > .05.

Future Directions: Preliminary Findings
• Results from the Parental Response to Distress subscale of a modified version of the Parent-Child Touch Questionnaire (Stern & Cassidy, 2016) shows a positive linear relation with left amygdala volume, r = .35, p < .01.
• However, no relation was found with right amygdala volume or bilateral hippocampal volume.
• We will continue to explore the implications of these findings.

References

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