

Relations between amygdala:hippocampus ratios and depressive symptoms in typically developing 4- to 8-year-old children

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Introduction

How do developmental changes in the hippocampus and amygdala relate to depressive symptoms in 4-8 year olds?

• Amygdala & Hippocampus

- Critical for encoding complex memory and emotion (Yavas et al., 2019)
- Associated with risk factors of depression such as negative memory bias (Gerritsen et al., 2012)
- Amygdala:hippocampus ratio associated with severity of anxiety in pediatric patients 8-17 yrs who were diagnosed with MDD (MacMillan et al., 2003)
- Amygdala and hippocampus undergo structural and functional changes in early childhood (<8 years; Riggins et al., 2018; Stern et al., 2019)

- **Research Gap:** Association between depression and amygdala:hippocampus not well documented in children <8 years

Hypothesis

Greater amygdala:hippocampus ratios will positively correlate with reported depressive symptoms in children ages 4-8 years

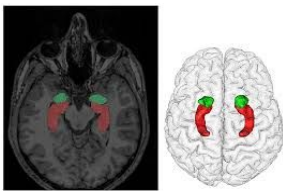
Methodology

Participants

- Sample of 56 participants ages 4-8 years ($M_{age} = 6.3$ years, $SD_{age} = 1.06$ years) taken from a previously conducted study (Riggins et al., 2018; Stern et al., 2019)

Procedures

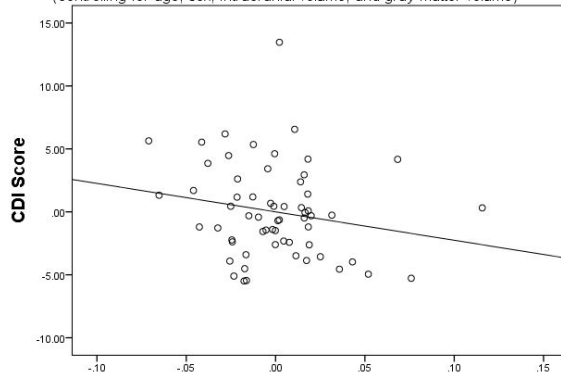
- T1-weighted whole brain structural MRI, processed in Freesurfer (v5.1)
- Children's Depression Inventory (CDI; Kovacs, 1985)



Results - Graphs

Total amygdala:hippocampus ratios and CDI scores

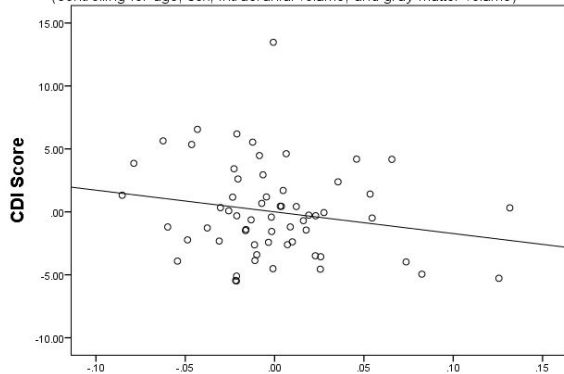
(controlling for age, sex, intracranial volume, and gray matter volume)



Total Amygdala:Hippocampus Ratio

Right amygdala:hippocampus ratios and CDI scores

(controlling for age, sex, intracranial volume, and gray matter volume)



Right Amygdala:Hippocampus Ratio

Results

- Total amygdala:hippocampus ratio **significantly predicted** CDI scores, $r(50) = -.234, p = .048$
- Right amygdala:hippocampus ratios **approached** significance when correlated with CDI scores, $r(50) = -.218, p = .060$

Discussion

- Amygdala:hippocampus ratios and depression scores were associated, but not in the hypothesized direction
- **Implications**
 - Contrary to the literature, *lower* amygdala:hippocampus ratio was correlated with increased depressive symptoms
 - Regions are developing during this period of childhood
 - Associations between these regions may differ in early childhood compared to later childhood (>8 years) and adulthood
 - We used a sample of typically developing children; results may be different in clinical samples
 - Suggests that these regions may contribute to depressive symptoms in childhood, and should be explored further
- **Future Directions**
 - Investigate this association longitudinally across samples from this study
 - Future research should also investigate this association in clinical populations (<8 years old)

References

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