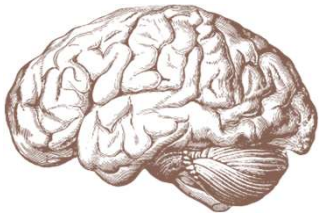

Modeling the Impact of Childhood Maltreatment on Hippocampal Volume and Memory Deficits in Major Depressive Disorder: A CAN-BIND-1 Study

AUTHORS

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01. Introduction

Childhood Maltreatment (CM) and Major Depressive Disorder (MDD) have both been independently associated with declarative memory deficits and hippocampal atrophy. Although it is known that the hippocampus is a critical hub for memory encoding, the mechanisms driving these deficits remains unclear. With approximately 50% of individuals with MDD having experience of childhood maltreatment, this study aims to model the contributions of CM and CM-associated hippocampal atrophy to memory deficits in MDD.

02. Objective

Better understanding the mechanisms behind memory deficits in MDD by examining:

1) If Diagnostic Status mediates CM's impact on Verbal/Visual Memory Performance
2) Hippocampal Volume mediates CM's impact on Verbal/Visual Memory Performance

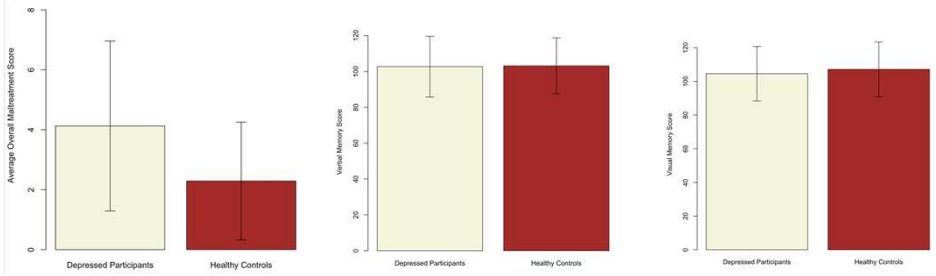
03. Methodology

Path analysis was performed on the CAN-BIND-1 dataset, using information from MDD participants (n=137) and healthy comparators (n=83).

- **CNS Vital Signs to assess memory**
- **CECA Interview to record childhood maltreatment experience**
- **3T MRI Scans to determine brain region volumes**
- **CentileBrain to generate normative deviation values for hippocampus volumes**

04. Results/Findings

- Across all maltreatment domains: emotional ($p < 0.001$), physical ($p < 0.01$), sexual ($p < 0.001$), and overall CM ($p < 0.001$), MDD participants had a significantly higher average score compared to healthy controls
- In MDD Participants, Overall CM had a significant direct and total effect on Verbal Memory (Direct Effect = -1.24, p = 0.004; Total Effect = -1.13, p = 0.012)
  - Sex Stratification: Significant direct and total effect of CM on Verbal Memory in MDD and Control females (Direct Effect = -1.49, p = 0.012; Total Effect = -1.41, p = 0.012), not males (Direct Effect = -1.01, p = 0.35; Total Effect = -0.79, p = 0.44)
- Overall CM did not have a significant direct or total effect on Visual Memory (Direct Effect = -0.37, p = 0.33; Total Effect = -0.48, p = 0.16)
- Diagnostic Status did not mediate Overall CM's effect on Verbal or Visual Memory ($p > 0.05$)
- Hippocampus Volume did not mediate Overall CM's effect on Verbal or Visual Memory ($p > 0.05$)



05. Conclusions

- In all maltreatment domains, MDD participants had significantly higher maltreatment scores compared to HC participants
- Diagnostic status was not significantly associated with verbal or visual memory and did not mediate childhood maltreatment's effects on verbal or visual memory.
- In MDD and Controls overall: no direct effect of childhood maltreatment on Visual Memory
- No mediation of HC volumes in Verbal/Visual Memory
- Sex may moderate childhood maltreatment's negative effects on Verbal Memory
  - Overall Childhood Maltreatment significantly affects Verbal Memory in MDD and Control females
- Future Directions
  - Assessing the role of brain age in memory deficits
  - Analyzing with further sex moderation models

06. References

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