



Hippocampal Activity During Extinction Recall Associated with Stressful Event Exposure

Samantha O. Goldberg, Rachel A. John, Amanda Hicks, Kayla Smith, Sonalee A. Joshi, James Abelson, Israel Liberzon, and Elizabeth R. Duval
 Department of Psychiatry, University of Michigan Health System

Background

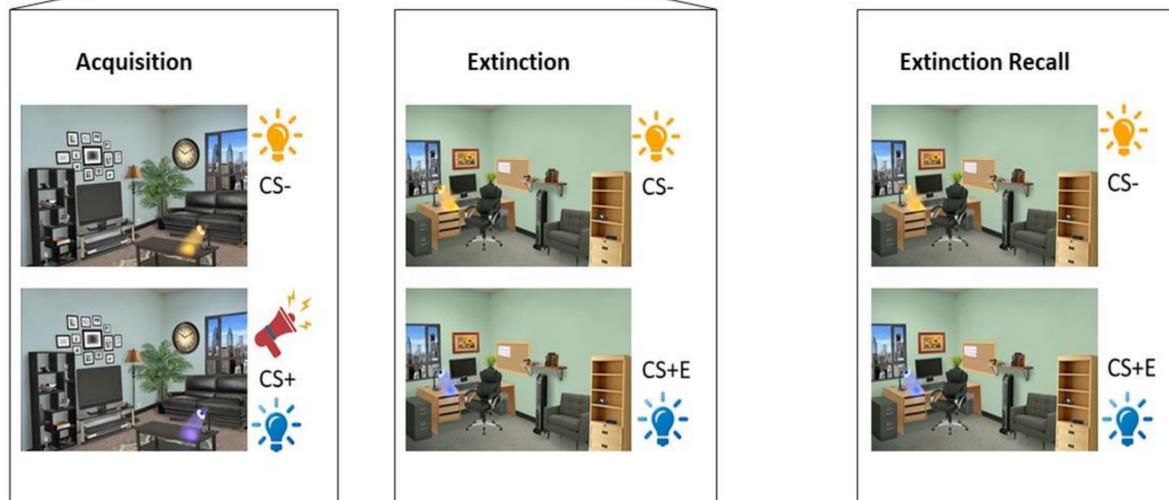
- Fear extinction recall (ER) is dependent on contextual memory, which allows modulation of fear to a potential threat, based on environmental information
 - Greater hippocampal activation is associated with better ER performance
 - Animals experience deficits in ER related to stressful event exposure, and stress exposure also impacts hippocampal functioning
 - Prior stress exposure may be related to ER and contextual memory, and hippocampal function in healthy individuals
- **Purpose:** Examine relationship between hippocampal function during ER and prior exposure to different types of stressful events in healthy individuals

Method

- 12 healthy individuals (*M age = 28.75*), 75% female
- Stressful Event Assessment: Life Events Checklist for DSM-5 (LEC-5)
- fMRI to assess for hippocampal function during ER
- Expectancy ratings during extinction recall to assess memory
 - Smaller ratings indicate lower expectation of hearing loud sound (better extinction recall)

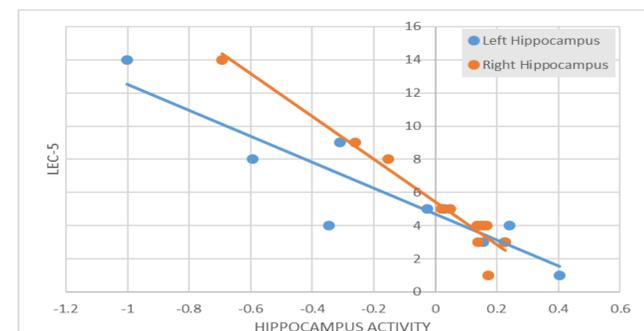
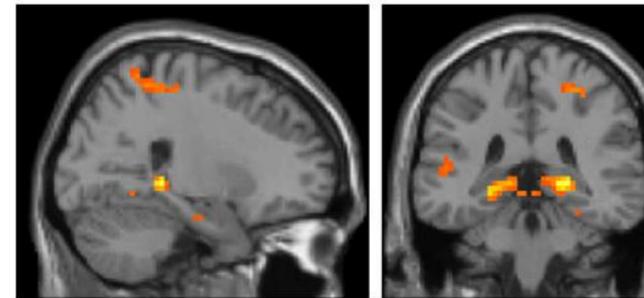
Day 1

Day 2

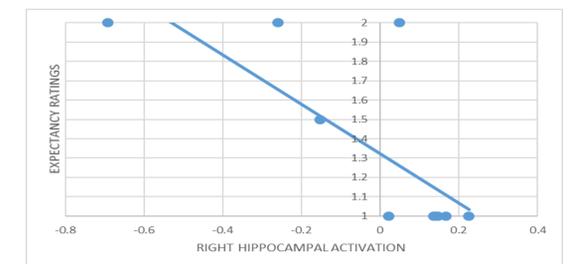


Results

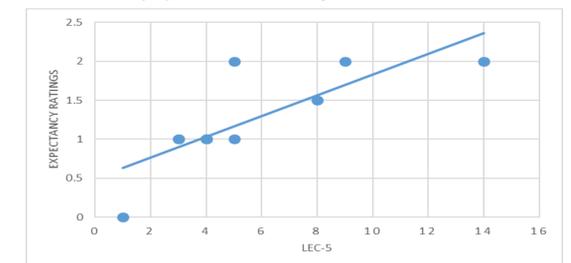
Hippocampal activation was negatively correlated with stressful event exposure (right hippocampus $p < 0.001$, FWE SVC; left hippocampus $p < 0.004$, FWE SVC).



Right hippocampal activation was negatively correlated with expectancy ratings $r(8) = -0.755$, $p = 0.012$.



Stressful event exposure was positively correlated with expectancy ratings $r(8) = 0.764$, $p = 0.010$



Summary

- Prior exposure to more types of stressful events associated with less hippocampal activity during ER
- More hippocampal activation during ER was associated with better ER (less expectancy)
- Less exposure to different types of stressful event exposure was associated with better ER
- Healthy individuals, even without ER deficits (all expectancy ratings were low), still exhibited relationships between hippocampal function, ER, and the extent of prior stress exposure
- Ongoing data collection will examine relationships between ER and hippocampal function in PTSD

Acknowledgements

- We thank Mike Angstadt for assistance with data processing and analysis, our funding source, the National Institute of Mental Health (Duval: K23MH109762), and our research participants.