



SAN DIEGO STATE UNIVERSITY



# Reward-Related Neural Correlates of Early Life Stress in School-aged Children

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## Background:

- Dysfunction in neural reward processing systems is thought to underlie a range of psychopathology
- Early life stress likely contributes to the development of aberrant reward processing
- Functional neuroimaging has shown early life stress-related alterations in threat processing and stress response systems

**Objective:** Examine the contribution of prospectively measured life stress in preschool-age children on reward-related neural activation and connectivity in school-age children, controlling for concurrent stressful life events.

## Methods:

- Children ( $N=46$ ) and caregivers reported children's exposure to early life stress between birth and preschool age (mean=4.8 years,  $SD=0.80$ ).
- At follow-up (mean age=7.52 years,  $SD=.78$ ) participants performed a child-friendly MID ("Piñata") task while undergoing fMRI acquisition
- ELS composite index of: *Parental Hostility, Single Parent Home, Family income <\$40k, Parental Education, Parental Depression, PAPA Scores*

## Analyses:

- Standard fMRI data preprocessing protocols were implemented using Analysis of Functional NeuroImages (AFNI)
- Whole-brain activation and connectivity (gPPI) analyses were done using AFNI's 3dMVM

### Sample Characteristics

Biological Sex (% female)	54.3%
Age Time 1 [range, mean (SD)]	3.0-5.83, 4.11 (0.78)
Age Time 2 [range, mean (SD)]	6.25-8.68, 7.31 (0.72)

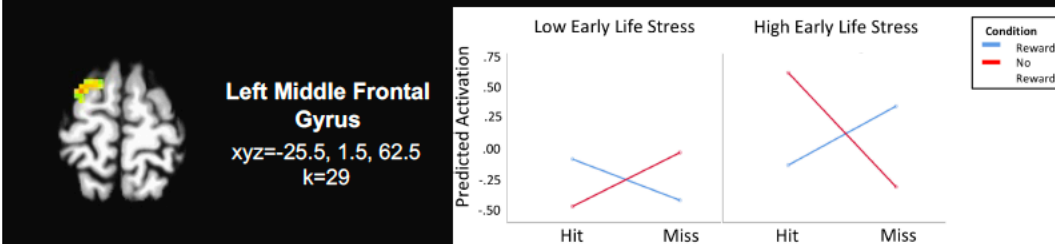
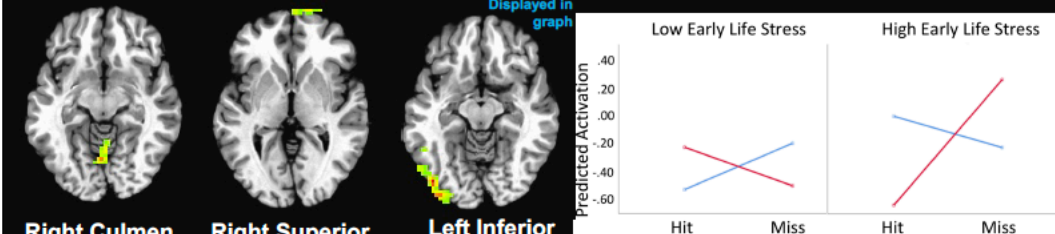
## Aberrant reward-related activation & connectivity relates to early life stress in school-aged children.

### Activation

Early Life Stress x Reward Condition ( $F_{1,43}=8.735$ )



Early Life Stress x Reward Condition x Performance ( $F_{1,43}=8.735$ )

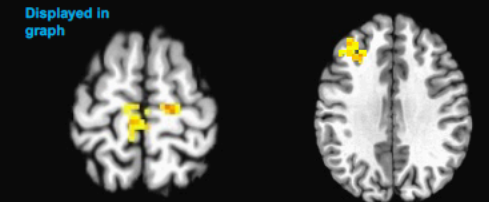


### Results:

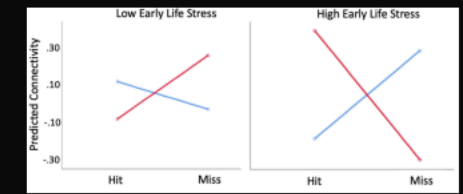
- Children with higher levels of early life stress, controlling for concurrent stressful life events, exhibited aberrant neural activation in multiple reward- and emotion-related regions
- There were aberrant patterns of connectivity between amygdalae and temporal and frontal regions, depending on the presence of a potential reward and whether or not the target was hit or missed

### Connectivity

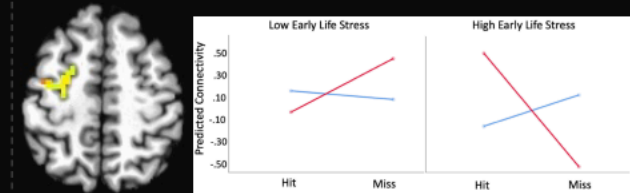
**Left Amygdala: Early Life Stress x Reward Condition x Performance** ( $F_{1,43}=8.735$ )



**Paracentral Lobule**  
xyz=-1.5, -28.5, 56.5  
k=100



**Right Amygdala: Early Life Stress x Reward Condition x Performance** ( $F_{1,43}=8.735$ )



**Left Middle Frontal Gyrus**  
xyz=-22.5, -1.5, 59.5, k=48

### Conclusion:

- We demonstrate, for the first time, the unique association between early life stress and reward-related neural activation and connectivity in a sample of preadolescent children
- Findings suggest that the effects of early life stress may begin to take hold as early as six- and seven-years old, altering core reward-related neural processes known to increase risk for later psychopathology