



## Introduction

- Early childhood, ages 4 to 7, is a period of rapid development that facilitates the acquisition of working memory (WM) and related areas of neurocognition through experiences.
- Working memory is a system involved in the retrieval, recall, manipulation and temporary storage of incoming information needed to complete a complex task and is required for most human behaviors. One of the most influential models describing the human working memory was developed by Baddeley and Hitch (1974).



- In early childhood, parents and caretakers play a central role in child development as they are curators of the environment, moderators of their child's exposure to the world, and can serve as primary protective barriers or sources of risk in adverse environments.
- More work is needed to understand and disentangle the relative influence of adversity in the distal versus more proximal caregiving environments.
- In the current study we aim to examine the relations of adverse experiences related to caregiving and distal risk to the neurofunction of visuospatial WM in early childhood.



Working Memory

# The Impact of Varying Dimensions of Adversity on the **Neurofunction of Working Memory in Early Childhood**

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### Methods



fNIRS:

Distal Factors Composite

- Income-to-Needs Ratio
- Family Support Scale Total
- Stress Index Total

- We measured the BOLD response of each child during the WM task.
- 16X16 cap configuration
- ROIs: DLPFC and Supramarginal gyrus



| Demographics.        |    | %    |  |
|----------------------|----|------|--|
| <u>Demographics.</u> | n  |      |  |
| Gender               |    |      |  |
| Female               | 34 | 45.3 |  |
| Male                 | 41 | 54.7 |  |
| Race                 |    |      |  |
| White/Caucasian      | 28 | 37.3 |  |
| Black/African        | 20 | 26.7 |  |
| American             |    |      |  |
| Asian                | 5  | 6.7  |  |
| Bi-racial            | 9  | 12   |  |
| Other                | 13 | 17.3 |  |
| Hispanic             | 36 | 48   |  |
|                      |    |      |  |

### Visuospatial Working Memory Task:

- 20 trials, 5 blocks
- Each trial with a delay period of 2,3,4,5, or 6 seconds





<u>Caregiving Mental Health Composite</u> • Beck's Depression Inventory Total State and Trait Anxiety Inventory Total



Results of Mixed Effects Models

| ROI    | TYPE | Contrast             | Beta    | SE    | DF  | Т      | q     |
|--------|------|----------------------|---------|-------|-----|--------|-------|
| LDLPFC | hbo  | x4SecondDelay:distal | -7.007  | 2.182 | 328 | -3.211 | .035  |
| LSUPG  | hbo  | x2SecondDelay:CG_MH  | -4.152  | 1.051 | 338 | -3.952 | <.001 |
| LSUPG  | hbo  | x3SecondDelay:CG_MH  | -2.747  | .992  | 338 | -2.678 | .048  |
| LSUPG  | hbr  | x4SecondDelay:distal | -10.791 | 2.293 | 328 | -4.706 | <.001 |

Note. For each model, age and gender were included as covariates.

### **Key Findings, Conclusion & Future Directions**

- lower hbo in the LDLPFC for the 4-sec delay condition.
- condition
- the LSUPG for the 2 and 3-second delay conditions.
- a differential impact on the neurofunctional activity of WM.
- relations of distal versus proximal risk to WM.

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### Results

No significant main effects or interactions of caregiving mental health and RSUPG No significant main effects or interactions of distal and RDLPFC

No significant main effects or interactions of caregiving mental health and RDLPFC No significant main effects or interactions of caregiving mental health and LDLPFC

• During a multi-condition working memory task, distal risk was associated with

• Distal risk was also associated with lower hbr in LSUPG, for the 4-sec delay

Caregiver psychopathology symptoms were associated with decreased hbo in

• These findings suggest that environmental risk and caregiver mental health have

Future directions for this project will include examining the role of WM performance and brain activity within each task condition to further unpack the

### References

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