

# **Research Portfolio**

## **Genetics, Cognition, and Neurodevelopmental Disorders**

Joey W. Trampush, Ph.D.

Department of Psychiatry and the Behavioral Sciences, USC Keck School of Medicine

Assistant Professor of Psychiatry and the Behavioral Sciences

February 4, 2025

**Hello ...**

### **Research Focus Areas**

#### **Core Research Domains**

- Neuropsychology
- Child, Adolescent, and Adult ADHD Diagnosis & Treatment
- Psychiatric Genetics
- Cognitive Genomics
- Neurodevelopment

#### **Methodological Expertise**

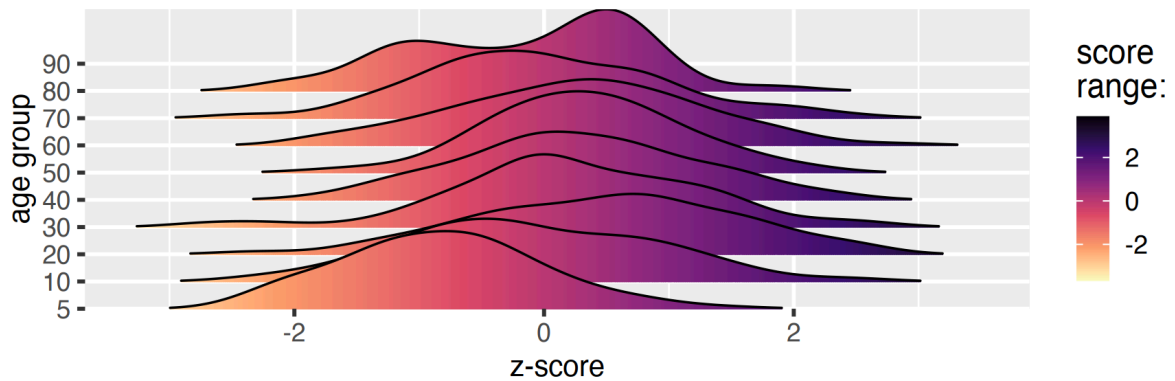
- Genome-wide Association Studies (GWAS)
- Systematic Reviews
- Clinical Guidelines Development
- Neuropsychological Assessment
- Data Science
- Language Learning Models (LLMs)

### **RDoC Cognitive Systems GWAS (R03 MH123787)**

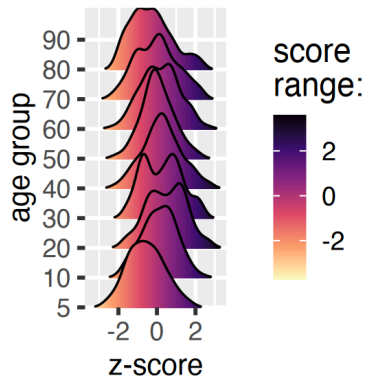
#### **Project Goals:**

- Investigate latent molecular genetic architecture of working memory
- Use existing COGENT consortium data
- Identify genome-wide allelic variation
- Focus on causal, not just correlational relationships

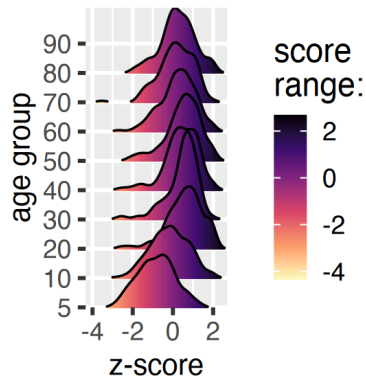
## WM factor



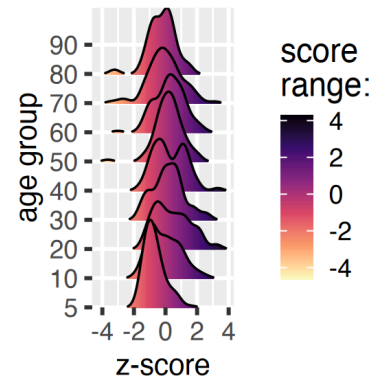
## dot counting



## nBack2



## nBack1



## Early Development & Brain Function (R01 DK110793)

### Collaboration with CHLA

#### Research Focus:

- Impact of early feeding practices
- Human milk oligosaccharides (HMOs)
- Effects on obesity development
- Brain development trajectories
- Longitudinal design
- Multi-modal assessment
- Developmental outcomes
- Clinical implications

## AHRQ Adult ADHD Review Project (75Q80120D00009)

Co-funded by the FDA

- Focus on diagnosis and treatment
- Evidence-based guidelines
- Treatment recommendations
- Child & adolescent ADHD project completed last year

## CAR-T Cell Therapy & Neurotoxicity

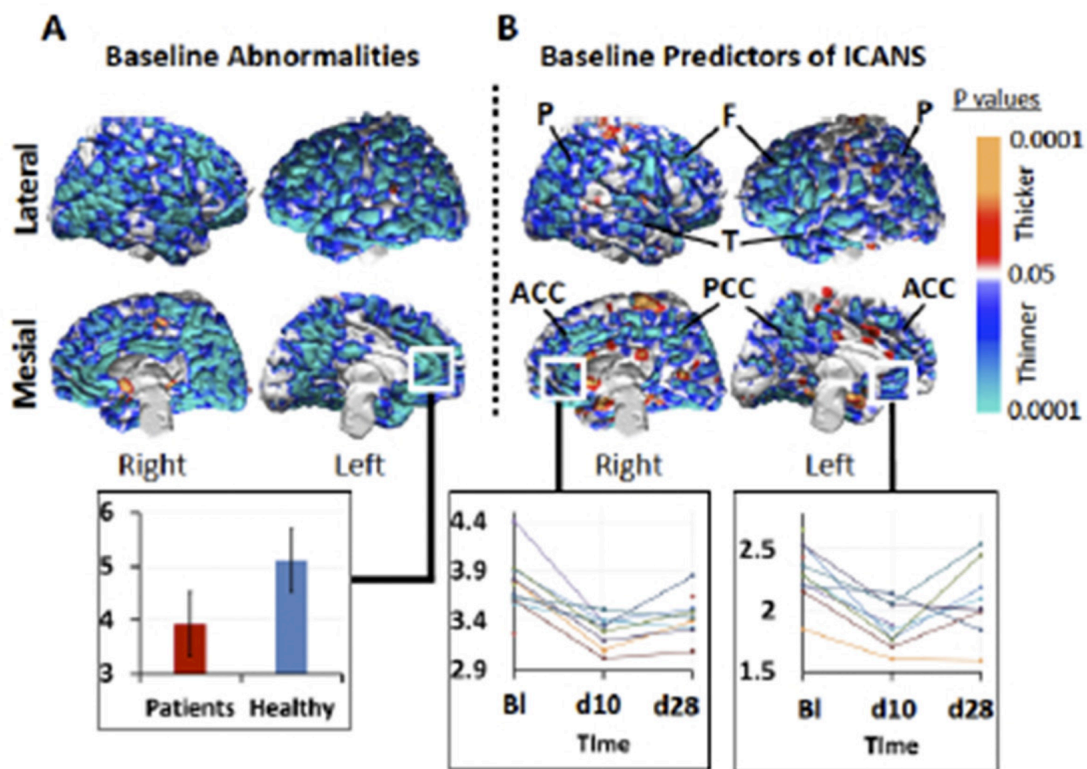
### R01 Collaboration with CHLA

#### Project Overview

#### ICANS Research Study:

- Investigating neurotoxicity in CAR-T therapy
- 80 pediatric ALL patients (5-21 years)
- Longitudinal assessment design
- Multi-modal brain & immune measures

**Figure 1: Cortical thinning and MRI predictors of ICANS**



## Hippocampal Stimulation & Memory

### Predicting Surgical Outcomes

- PI: Brian Lee, MD, PhD

## **Study Overview**

Three key questions:

1. WHERE to stimulate in hippocampus?
2. WHEN during memory tasks?
3. HOW (stimulation parameters)?

## **Data Science**

### **Focus on reproducible research**

- R, some Python
- Quarto, Typst

### **GitHub Repos**

- Adult templates for neuropsych
- Adult templates for neuropsych
- Adult templates for neuropsychneurotyp-forensic
- Neuropsych reports

## **Large-Scale Biobank Data**

- UK Biobank
- ABCD Study
- 23andMe
- Many others

## **Language Learning Models (LLM)**

### **Application to Neuropsychological Evaluation**

Developing LLM to process neurocognitive and behavioral data from evaluations that otherwise take several hours.

- Summarization using Chain of Density

## **Integration & Clinical Impact**

How these projects work together:

1. Genetic architecture → Treatment targets
2. Early development → Prevention strategies
3. Clinical guidelines → Evidence-based care
4. Translational potential → Improved outcomes

## **Future Directions**

### **Research Goals:**

- Expand genetic findings
- Identify biomarkers
- Develop interventions

- Improve diagnostics

**Clinical Applications:**

- Personalized medicine
- Early intervention
- Treatment optimization
- Outcome prediction

**Thank you!!**