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Functional Brain Differences in Epilepsy and Psychogenic Non-epileptic Seizure Disorders using Magnetoencephalography

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RATIONALE

This study examines resting-state brain activity in children with epilepsy and Psychogenic Non-Epileptic Seizures (PNES) using magnetoencephalography (MEG), comparing both groups to typically developing healthy controls (TD), aged 10-20 years old.

We also explore role of psychiatric symptoms on brain function. By identifying distinct neural patterns associated with seizures and psychopathology, this research aims to improve diagnostic accuracy and guide more effective treatment strategies for children with seizure disorders and related psychiatric conditions.

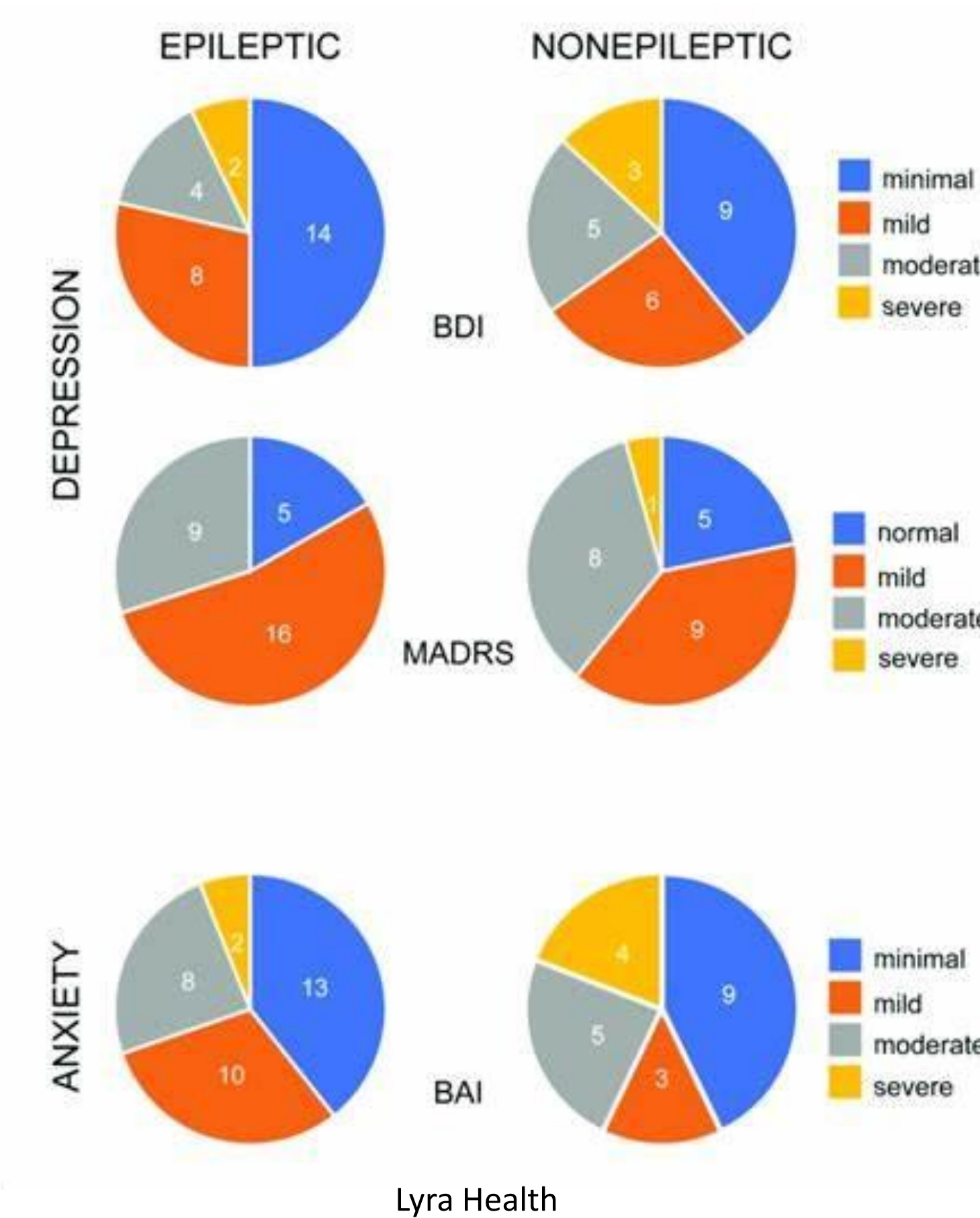
RESEARCH QUESTIONS

1. How does resting-state brain activity between regions (i.e., connectivity) differ between children with epilepsy, PNES, and typically developing controls using MEG?
2. Do patterns of resting-state neural activity correlate with psychiatric symptoms such as anxiety and depression levels?

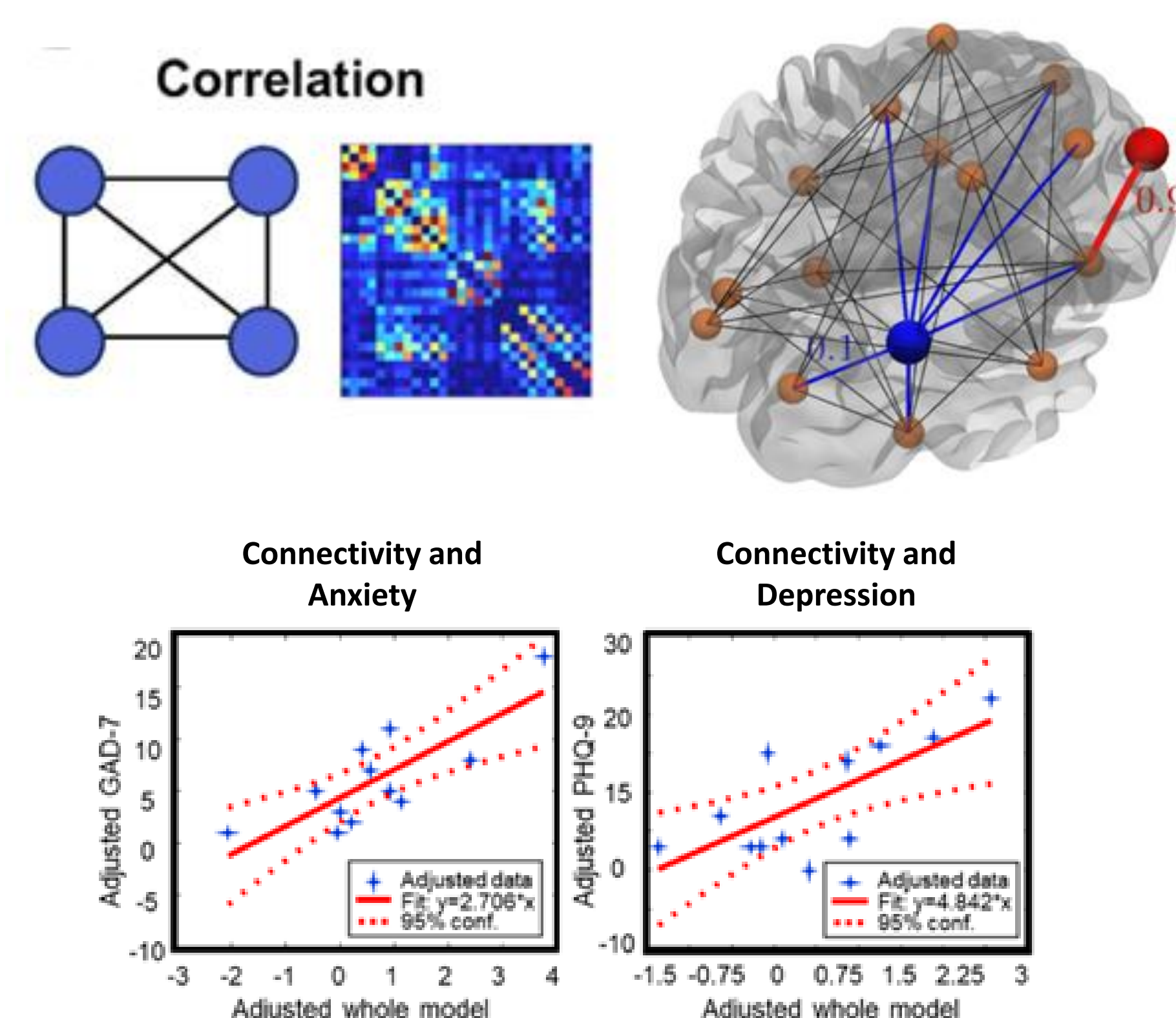
INTRODUCTION

Epilepsy is a neurological disorder characterized by abnormal brain activity causing seizures. Psychogenic non-epileptic seizures (PNES) are a functional neurological disorder characterized by seizure-like episodes without epileptic activity. Both seizure disorders are often linked to psychiatric conditions like anxiety and depression. Differentiating between epilepsy, PNES, and the role of psychopathology is crucial for accurate diagnosis and treatment.

Clinical Features of Seizure Disorders		
	Epilepsy	PNES
Synchronized Motor Activity	X	
Vocalizations		X
Incontinence	X	
Cyanosis	X	
Postictal State	X	



EXPECTED RESULTS



We anticipate finding distinct connectivity patterns in epilepsy and PNES groups compared to TD. Specifically, we expect main connectivity patterns to center around three networks: default mode, salience, and executive control.

Additionally, we predict that resting-state connectivity will correlate with psychiatric symptom severity levels, i.e., depression and anxiety, providing insights into the interplay between seizure disorders and mental health.

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METHODS

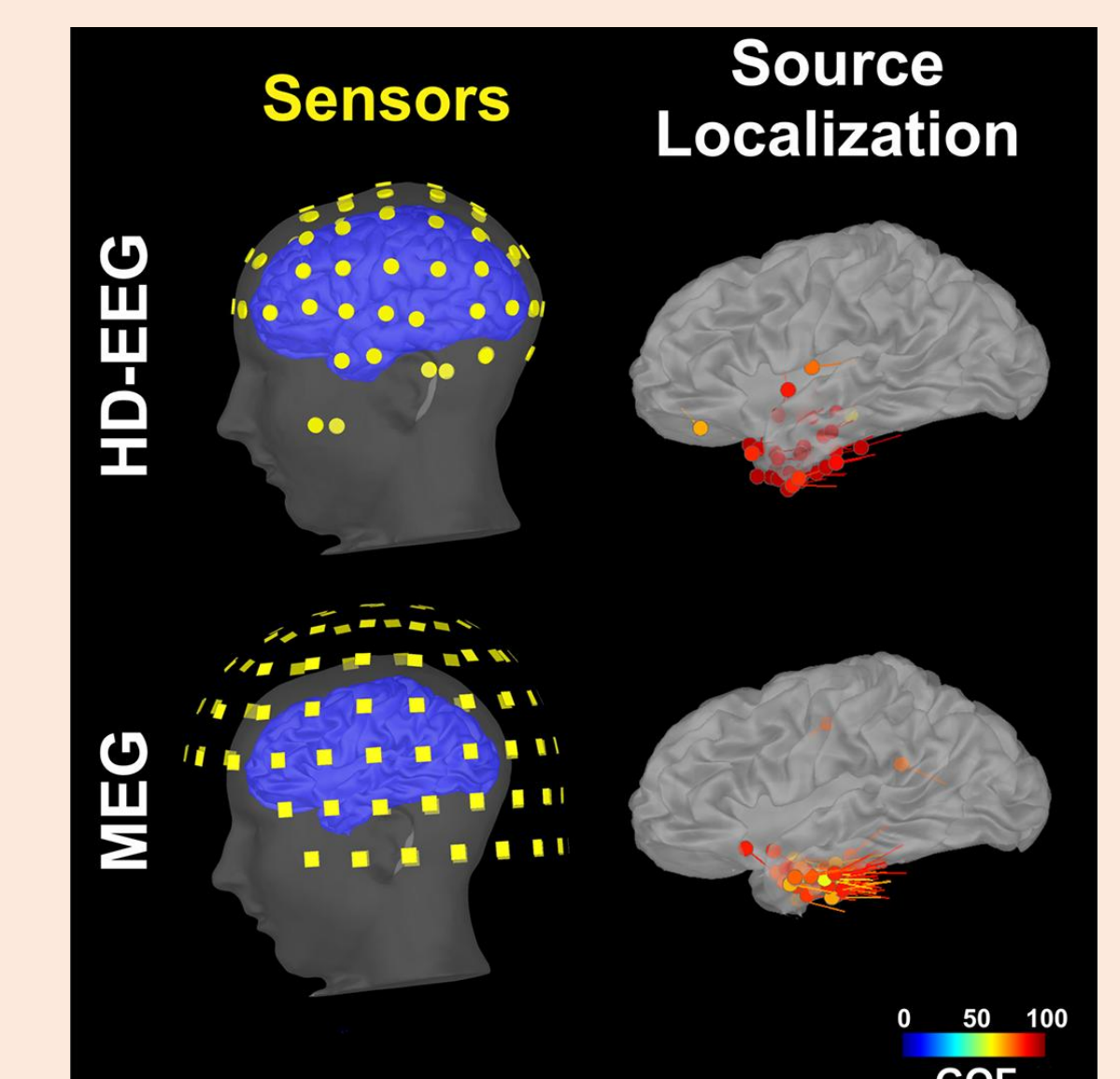
This study includes adolescents aged 10-19 years, recruited from Cook Children's Medical Center, divided into three groups: epilepsy, PNES, and TD.

Participants underwent 10 minutes of resting-state MEG recordings (5 minutes eyes open, 5 minutes eyes closed).

Psychiatric symptoms were assessed using the Generalized Anxiety Disorder-7 (GAD-7) and Patient Health Questionnaire-9 (PHQ-9) scales.

Resting-state connectivity will be performed between the groups, while Pearson correlation analyses will assess relationships between spectral power and psychiatric symptoms.

MEG



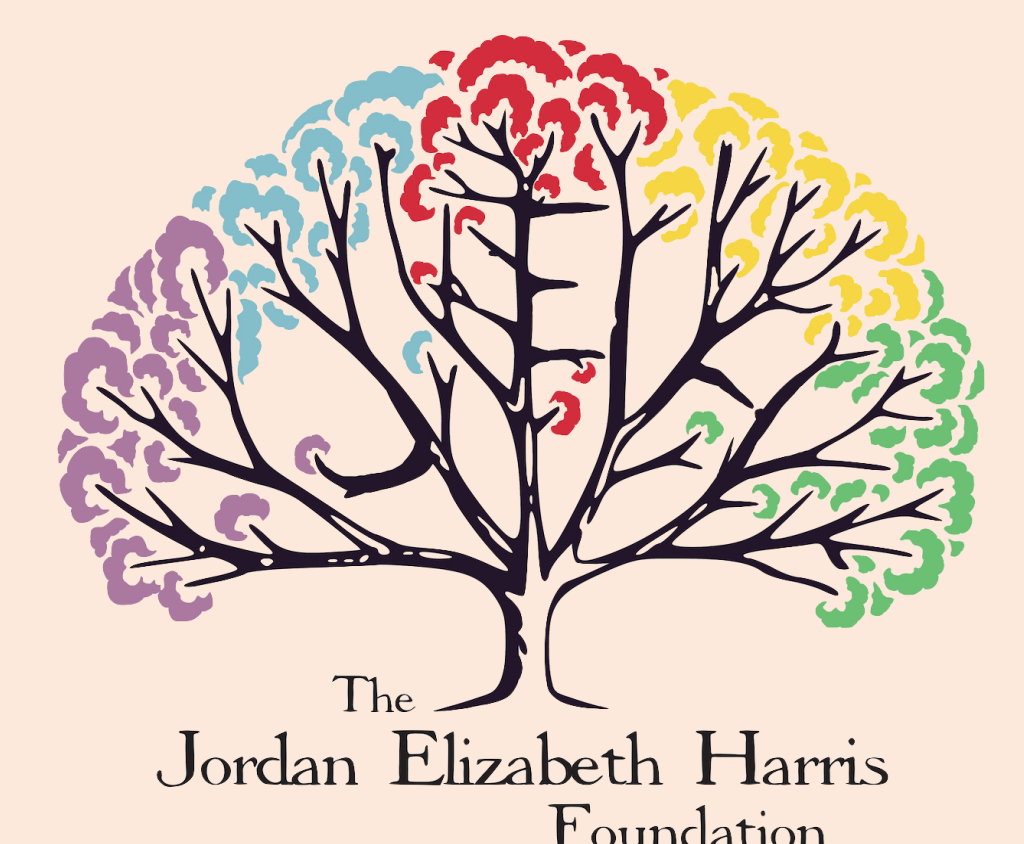
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