

Resting-state Brain Connectivity and the Role of Depression in Pediatric Epilepsy using Functional Magnetic Resonance Imaging CookChildren's. Florencio Gobellan, McNair Scholar F. Kathryn King, MS., Christos Papadelis, Ph.D., Tracy L. Greer Ph.D MSCS., Crystal M. Cooper, Ph.D.

INTRODUCTION

Epilepsy is a chronic brain disorder causing seizures due to abnormal electrical discharges in brain, with causes including birth the complications, brain injuries, or unknown factors in half of the cases. It can be generalized or focal, affecting different brain regions. In 2015, 1.2% of the US population had active epilepsy. Research in pediatric epilepsy examines brain connectivity changes using fMRI and investigates the link between epilepsy and psychiatric conditions like anxiety and depression, focusing on brain networks such as the default-mode network (DMN), salience network (SN), and central executive network (CEN) to enhance treatment and understanding.



RESEARCH QUESTIONS

- 1.Do youth with epilepsy differ from healthy controls in their resting-state brain activity using fMRI?
- resting-state brain activity 2.Do markers correlate with depression and anxiety severity?



Epilepsy is one of the most common neurological disorders in children, characterized by abnormal bursts of electrical discharged in the brain. It is often accompanied by psychiatric comorbidities. The neural correlates of this comorbidity is not we established. The primary aim of this study was to use functional Magnetic Resonance Imaging (fMRI) to characterize resting-stat brain activity (i.e., connectivity between brain regions) in pediatric epilepsy, comparing it to healthy controls. The secondary ai is to identify activity related to depression in epilepsy. Thirty-seven adolescents (13 epilepsy; 24 controls; aged 10–19; females) underwent a 10-min fMRI scan and were assessed for depression using the 9-item Patient Health Questionnaire Connectivity between 19 key regions-of-interest were performed. Our findings showed patients with epilepsy had high connectivity patterns between regions of the Default Mode (DMN), Salience (SN), and Central Executive (CEN) Networks relative to healthy controls, particularly between DMN and SN regions. Epilepsy patients with depression had lower connectivity betwee the SN and other networks, and regions within the CEN. Our findings suggest that distinct network disruptions relate psychiatric symptoms in epilepsy. Further research is needed to develop targeted interventions related to brain function improve mental health outcomes in adolescents with epilepsy.

Population: 37 adolescents (aged 10–19) 13 having epilepsy (PWE) 24 being typically developing controls (TD)

Processing & Analysis: The rsfMRI data were preprocessed using the Connectivity Toolbox and SPM12. Connectivity between 19 key ROIs in emotion, the central executive network (CEN), and the default mode network (DMN) were compared between typically developing (TD) individuals and people with epilepsy (PWE). Further analyses examined the impact of epilepsy on connectivity patterns and the role of depression within the PWE group.

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Department of Psychology

ABSTRACT

METHODS

Measures:

RESULTS





9-Item Patient Health Questionnaire (PHQ9) to assess depression symptom severity 10-minute resting-state functional magnetic resonance imaging (rsfMRI; eyes open)

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fMRI Scan



CONTACT

Florencio Gobellan Fxg1687@mavs.uta.edu Crystal M. Cooper, Ph.D Crystal.Cooper@uta.edu Tracy L. Greer, Ph.D., MSCS Tracy.Greer@uta.edu F. Kathryn King, M.S. fek6250@mavs.uta.edu

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