CHRD 2024: Abstract Submission Form

Presenter Name
Mohammad Soleyman Nejad

Presenter Status
PhD Student

Role in the project
Design
Perform Experiments
Analyze Data
Write Abstract

Research Category
Basic Science

Title
Elucidating EEG Markers of Acute Stress in Young Children During a Performance-related Challenge

Background
Stress is prevalent in modern society, with young children particularly vul\nerable to its lasting negative effects. This study explores the relationship between neural activity and cardiac responses in children under challenge-related acute stress. While neural targets of stress exposure have been identified, neurophysiological responses to acute stress remain under-explored.

Objective
We hypothesize that specific EEG bandwidths (e.g., theta and beta) will correlate with cardiac markers such as HRV and pre-ejection period during stress, with distinct patterns expected between stressor and control conditions.

Methods
100 children, aged 5-6, will be recruited for concurrent neural and cardiac assessments using electroencephalogram (EEG), electrocardiogram (ECG), and impedance cardiogram (ICG) during a laboratory-induced acute stressor. Multilevel modeling (MLM) will characterize fluctuations in cardiac markers (interbeat interval, high-frequency heart rate variability, pre-ejection period) in relation to EEG bandwidths (delta, 0.5–3 Hz; theta, 3–7 Hz; alpha, 7–12 Hz; beta, 12–20 Hz).

Results
Children in the stressor group are expected to show significant stress responses, including decreases in HF-HRV, shortening of PEP, and increases in heart rate and cortisol levels compared to controls. Changes in EEG power, particularly in theta and beta bands, are expected post-stressor. EEG power will be assessed at rest, before and after stressor exposure, although this hypothesis is exploratory. MLM will further examine the associations between changes in EEG power and cardiac activity.

Conclusion
This study combines behavioral, neural, cardiac, and endocrine measures to provide a comprehensive understanding of the autonomic nervous system's role in acute stress. The findings will advance knowledge of acute stress's neural foundations, paving the way for targeted interventions to mitigate long-term impacts.

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No

Authors

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