The role of resting-state EEG localized activation and central nervous system arousal in executive function performance in children with Attention-Deficit/Hyperactivity Disorder.


Abstract

OBJECTIVE:
This study explored the relationships between resting-state electroencephalogram (RS-EEG) localized activation and two important types of executive functions (EF) to extend the prognostic utilization of RS-EEG in children with Attention-Deficit/Hyperactivity Disorder (AD/HD). Also, the role of central nervous system (CNS) arousal in the relationships was examined.

METHODS:
Fifty-eight children with AD/HD participated in the study. RS-EEG localized activation was derived from spectral power differences between EEG in eyes-closed and eyes-open conditions. CNS arousal was measured based on alpha band power. Common and everyday EF scores were obtained as EF outcomes.

RESULTS:
Frontal delta activation predicted common EF ability and posterior alpha activation predicted everyday EF. A serial mediation analysis found that lower CNS baseline arousal was related to greater arousal and delta activation in series, which in turn related to worse common EF. A follow-up study found that baseline arousal was related to larger interference cost.

CONCLUSIONS:
RS-EEG is indicative of individual differences in two important types of EF in children with AD/HD. Lower CNS arousal may be a driving force for the poorer common EF performance.

SIGNIFICANCE:
The current study supports prognostic utilization of RS-EEG and AD/HD models that take resting brain activity into consideration in children with AD/HD.