

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

Zhang DW, Johnstone SJ, Roodenrys S, Luo X, Li H, Wang E, Zhao Q, Song Y, Liu L, Qian Q, Wang Y, Sun L.

Clin Neurophysiol. 2018 Mar 30;129(6):1192-1200.
doi: 10.1016/j.clinph.2018.03.009.

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.