Age-related changes in resting-state EEG activity in Attention Deficit/Hyperactivity Disorder: a cross-sectional study

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ABSTRACT:

Numerous studies indicate that Attention Deficit/Hyperactivity Disorder (ADHD) is related to some developmental trends, as its symptoms change widely over time. Nevertheless, the etiology of this phenomenon remains ambiguous. There is a disagreement whether ADHD is related to deviations in brain development or to a delay in brain maturation. The model of deviated brain development suggests that the ADHD brain matures in a fundamentally different way, and does not reach normal maturity at any developmental stage. On the contrary, the delayed brain maturation model assumes that the ADHD brain indeed matures in a different, delayed way in comparison to healthy age-matched controls, yet eventually reaches proper maturation. We investigated age-related changes in resting-state EEG activity to find evidence to support one of the alternative models. A total of 141 children and teenagers participated in the study; 67 diagnosed with ADHD and 74 healthy controls. The absolute power of delta, theta, alpha and beta frequency bands was analyzed. We observed a significant developmental pattern of decreasing absolute EEG power in both groups. Nonetheless, ADHD was characterized by consistently lower absolute EEG power, mostly in the theta frequency band, in comparison to healthy controls. Our results are in line with the deviant brain maturation theory of ADHD, as the observed effects of age-related changes in EEG power are parallel but different in the two groups.