# A Novel Predictive Paradigm for Pediatric ADHD Behavior through Thalamocortical White Matter Analysis

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Attention deficit hyperactivity disorder (ADHD) is marked by persistent deficits in hyperactivity/attention that impede daily function. Since the discovery of its existence, there remains a lack of understanding on the neurophysiological implications of ADHD. Therefore, the current study examined the detrimental impacts of ADHD on neurophysiology in a pediatric population. Given that previous research has emphasized the role of thalamocortical white matter tracts in early cognitive development, the current study had two main hypotheses: (1) pediatric ADHD patients would demonstrate significantly impaired thalamocortical integrity when compared to age-matched controls and (2) these structural deficits would significantly correlate with neurocognitive data on behavioral disruptions associated with ADHD. MRI and behavioral data on 44 subjects (22 pediatric ADHD patients and 22 age-matched controls), were obtained through an open database: The Child's Mind Institute. A DTI tractography analysis revealed significant differences in the integrity of three thalamocortical tracts in the frontal, parietal, and paracentral regions that significantly correlated to behavioral disruptions observed in the patient population. Comparative analysis between the ADHD and control populations was also conducted on the data through a standard receiver operating characteristic (ROC) analysis. The resulting curve yielded an AUC of 0.82, indicating that DTI analysis can accurately predict ADHD status, which has the potential to improve the diagnosis of ADHD. The present study offers novel insight into the pediatric ADHD pathology from a neurological, rather than behavioral perspective and takes a first step towards developing therapeutic interventions that utilize a more holistic approach.

**Awards Won:**