The Complex Relationship Between IQ and Attention Deficit Hyperactivity Disorder Symptoms: Insights From Behaviors, Cognition, and Brain in 5,138 Children With Attention Deficit Hyperactivity Disorder

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Abstract : Background: There has been speculation that a high IQ may not necessarily provide protection against attention deficit hyperactivity disorder (ADHD), and there may be a U-shaped correlation between IQ and ADHD symptoms. However, this speculation has not been validated in the ADHD population in any study so far. Method: We conducted a study with 5,138 children who have been professionally diagnosed with ADHD and have a wide range of IQ levels. General Linear Models were used to determine the optimal model between IQ and ADHD core symptoms with sex and age as covariates. The ADHD symptoms we looked at included the total scores (TO), inattention (IA) and hyperactivity/impulsivity (HI). Wechsler Intelligence scale were used to assess IQ [Full-Scale IQ (FSIQ), Verbal IQ (VIQ), and Performance IQ (PIQ)]. Furthermore, we examined the correlation between IQ and the execution function [Behavior Rating Inventory of Executive Function (BRIEF)], as well as between IQ and brain surface area, to determine if the associations between IQ and ADHD symptoms are reflected in executive functions and brain structure. Results: Consistent with previous research, the results indicated that FSIQ and VIQ both showed a linear negative correlation with the TO and IA scores of ADHD. However, PIQ showed an inverted U-shaped relationship with the TO and HI scores of ADHD, with 103 as the peak point. These findings were also partially reflected in the relationship between IQ and executive functions, as well as IQ and brain surface area. Conclusion: To sum up, the relationship between IQ and ADHD symptoms is not straightforward. Our study confirms long-standing academic hypotheses and finds that PIQ exhibits an inverted U-shaped relationship with ADHD symptoms. This study enhances our understanding of symptoms and behaviors of ADHD with varying IQ characteristics and provides some evidence for targeted clinical intervention.

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