Intellectual Disability in Children with Attention Deficit Hyperactivity Disorder

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Objective To determine whether children with attention deficit hyperactivity disorder (ADHD) and mild intellectual disability (ID) are a clinically distinct ADHD subgroup.

Study design This was a cross-sectional study comparing clinical characteristics (ADHD subtypes, total number of symptoms, and rates of common comorbidities) between children with ADHD and mild ID and those with ADHD and IQ test scores >70, and also between children with ADHD and ID and a general population sample of children with ID alone. The sample comprised a clinical sample of children with ADHD with ID (n = 97) and without ID (n = 874) and a general population sample of children with ID and without ADHD (n = 58).

Results After correcting for multiple statistical tests, no differences were found between the 2 ADHD groups on any measure except the presence of conduct disorder (CD) symptoms and diagnoses. Children with ADHD and ID had higher rates of both (OR, 2.38; 95% CI, 1.71-3.32 and OR, 2.69; 95% CI, 1.69-4.28, respectively). Furthermore, children with ADHD and ID had significantly higher rates of oppositional defiant disorder (OR, 5.54; 95% CI, 2.86-10.75) and CD (OR, 13.66; 95% CI, 3.25-57.42) symptoms and a higher incidence of oppositional defiant disorder diagnoses (OR, 30.99; 95% CI, 6.38-150.39) compared with children with ID without ADHD.

Conclusion Children with ADHD and mild ID appear to be clinically typical of children with ADHD except for more conduct problems. This finding has implications for clinicians treating these children in terms of acknowledging the presence and impact of ADHD symptoms above and beyond ID and dealing with a comorbid CD. *(J Pediatr 2013;163:890-5)*.

Attention deficit hyperactivity disorder (ADHD) is a disabling condition, affecting 1.4%-6% of children.[1] Little is known of the clinical presentation and etiology of ADHD in children with intellectual disability (ID), because those with lower cognitive ability (IQ scores <70) are often excluded from studies of ADHD,[2] despite evidence that ADHD is more common in children with ID, and that the risk increases with increasing severity of ID.[3]

It has been suggested that ADHD does not occur in children with ID, and that any inappropriate behavior in children with ID is secondary to "mental impairment."[4] That view is not supported by current evidence, however. Studies have shown that ADHD occurs more commonly in these children but may be underdiagnosed owing to such issues as "diagnostic overshadowing," the tendency of clinicians to overlook additional psychiatric diagnoses after a diagnosis of ID is made, or "masking," in which the clinical characteristics of a mental disorder are masked by a cognitive, language, or speech deficit.[5]

A population-based study estimating the prevalence of psychiatric diagnoses in children with ID identified hyperkinetic disorder as the most common psychiatric disorder.[6] Studies of children with mild and borderline ID have identified ADHD in 8%-39% of cases.[7-9] A crucial clinical issue is whether or not the clinical pattern of comorbidity in this group is the same as that seen in children with ADHD but without ID. This is important in determining the level and type of services and clinical care required for this subgroup.

In the present study, we compared the rates of comorbid problems and ADHD symptom levels in 2 groups of children with ADHD, 1 group with ID (ADHD + ID group) and the other group without ID (ADHD-only group). Consistent with previous studies of ADHD, we defined ID is an IQ test score <70. We hypothesized that the ADHD profiles in the 2 groups (ADHD + ID [IQ <70] vs ADHD-only [IQ ≥70]) would be highly similar

ADHD	Attention deficit hyperactivity disorder
ALSPAC	Avon Longitudinal Study of Parents and Children
ASD	Autism spectrum disorder
CAPA	Child and Adolescent Psychiatry Assessment
CD	Conduct disorder
CNV	Copy number variant
DSM-III-R	*Diagnostic and Statistical Manual of Mental Disorders, 3rd edition revised*
DSM-IV	*Diagnostic and Statistical Manual of Mental Disorders, 4th edition*
ID	Intellectual disability
ODD	Oppositional defiant disorder

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in terms of symptoms, rates of subtypes, and patterns of comorbid problems (ie, oppositional behaviors, conduct disorder [CD], anxiety, and depression).

Methods

Participants were recruited from more than 30 child and adolescent mental health services or community pediatric outpatient clinics in Wales, England, and Scotland for a genetic study of ADHD. Given this study's focus on evaluating for the presence of nonsyndromal ID in children with ADHD, *International Statistical Classification of Diseases and Related Health Problems, 10th revision*[10] and *Diagnostic and Statistical Manual of Mental Disorders, 4th edition* (DSM-IV)[11] exclusion criteria were used. Children with a known diagnosis of schizophrenia, autism spectrum disorder (ASD), bipolar disorder, Tourette syndrome, epilepsy, brain damage, or any other neurologic or genetic disorder were excluded. Information on these conditions was derived from a questionnaire completed by the referring clinician, diagnostic interview information obtained from parents, and quality control of genetic data performed as part of the genetic study. Children with IQ <50 were also excluded, because the study focused on mild ID, and the assessment measures have not yet been validated in individuals with severe ID.

A total of 971 children met the inclusion criteria and had sufficient data for analysis. All of these children met the DSM-IV[11] or *Diagnostic and Statistical Manual of Mental Disorders, 3rd edition revised* (DSM-III-R)[12] criteria for a diagnosis of ADHD, which was confirmed through research diagnostic interviews.[13] The children ranged in age from 5 to 17 years (mean age, 10.1 ± 2.8 years), and included 148 females (15.2%). The study received ethical approval from the North West England and Wales Multicentre Research Ethics Committees. For all subjects, written informed consent was obtained from parents and assent/consent from children.

Cognitive ability was assessed using *the Wechsler Intelligence Scale for Children versions III* (n = 381) and *IV* (n = 590)[14,15] to obtain an estimate of full-scale IQ (using all required subtests). Two versions of this assessment tool were used because version IV was released during the study period. The assessment was performed by trained psychologists. In children who had recently undergone IQ assessment in school, that score was used to determine ID status. In accordance with *International Statistical Classification of Diseases and Related Health Problems, 10th revision* and DSM-IV criteria, children with an IQ score of 50-69 were considered to have mild mental retardation/ID and classified in the ADHD + ID group. Children with an IQ score ≥70 were classified in the ADHD-only group.

ADHD symptoms, impairment, and diagnoses were confirmed using the Child and Adolescent Psychiatry Assessment (CAPA),[13] a research diagnostic interview with parents. Interviews were performed by trained psychologists supervised weekly by a child psychiatrist. Interrater reliability for ADHD was perfect ($\kappa = 1.0$). Information on ADHD symptoms and school impairments was obtained using the Child ADHD Teacher Telephone Interview,[16] the DuPaul teacher rating scale,[17] or the Conners teacher rating scale.[18] A diagnosis of ADHD required that the child have symptoms meeting DSM-IV or DSM-III-R criteria, substantial impairment from symptoms at home, and pervasive symptoms and impairment in the school setting.

The CAPA was also used to assess current symptoms, impairment, and DSM-IV diagnoses of comorbid oppositional defiant disorder (ODD), CD, anxiety disorders (ie, generalized anxiety disorder, social anxiety, and separation anxiety), depression, and mania. Comorbid symptoms were also assessed using the child version of the CAPA[19] for children aged ≥12 years. Comorbid anxiety or depression symptoms were endorsed if reported by the parent or child. Owing to the scarcity of anxiety and depression diagnoses in the sample, only symptoms of these disorders could be analyzed. Interrater reliability for parent-rated CD symptoms was very good (intraclass correlation, 0.98).

Avon Longitudinal Study of Parents and Children

To compare clinical variables found to be associated in the primary analysis in the ADHD + ID and ADHD-only groups, we turned to the Avon Longitudinal Study of Parents and Children (ALSPAC), a large, well-characterized longitudinal dataset. Details of the study methodology are available elsewhere.[20] Ethical approval for all aspects of the study was obtained from the ALSPAC Law and Ethics Committee and the local Research Ethics Committees. Parents provided written consent and the children provided assent at each assessment. IQ had been assessed at age 8 years using the *Wechsler Intelligence Scale for Children version III*.[14] Children who scored between 50 and 69 on the IQ test and had no diagnosis of ADHD or ASD were included in our analysis. A total of 74 children (1.2% of the ALSPAC sample with complete data on these measures) met these criteria. Data on ADHD, ASD, ODD, and CD symptoms and diagnoses were collected from participants at age 128 months, using the parent and teacher Development and Well-Being Assessment.[21] Complete clinical data were available for 58 children, who constituted the ID-only group. These children were 10-11 years old at the time of clinical assessment (mean, 10.8 ± 0.1 years), and 27 were female (46.6%).

Statistical Analyses

The ADHD clinical sample was divided into those with ID (ADHD + ID; n = 97) and those without ID (ADHD-only; n = 874). The 2 groups were compared on each of the clinical factors identified. All descriptive statistics are presented as raw scores for ease of interpretation. Where a variable was nonnormally distributed, the scores were naturally logarithmically transformed, and analyses were run on transformed scores.

Clinical predictor variables were used to predict binary outcomes (ADHD + ID or ADHD-only) using regression