Adult Attention Deficit Hyperactivity Disorder: Moving Beyond DSM-IV

Most child psychiatrists begin their clinical training as residents in adult psychiatry. One developmental consequence of this educational trajectory is the assumption, not always correct, that knowledge concerning the phenomenology and treatment of adult psychopathology is directly applicable to psychiatric disorders occurring in children and adolescents. The great exception to this is attention deficit hyperactivity disorder (ADHD), for which our approaches to phenomenology, pathophysiology, and treatment are largely derived from our experiences with children and applied, with varying degrees of evidence, to adults.

In 1968, DSM-II described the entity now recognized as ADHD as "the hyperkinetic reaction of childhood," with the clear implication that this behavioral disturbance was a reaction to family environment. Prevailing opinion further held that the disorder represented a developmental delay usually outgrown in adolescence (1). The publication of subsequent editions of DSM—including DSM-III in 1980, DSM-III-R in 1987, and DSM-IV in 1994—emphasized a descriptive approach to the classification of mental disorders that was neutral, or "atheoretical," with respect to etiology. In latter editions of DSM, field trials of potential symptoms provided an empirical basis for diagnostic criteria that optimized reliability and differentiation from other disorders (2, 3).

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In the 26 years since the publication of DSM-III, ADHD has been increasingly recognized as a biologically driven, brain-based neurodevelopmental disorder (4). ADHD has been shown to be among the most heritable of psychiatric disorders and is theorized to arise from the interplay of environmental risk factors and multiple susceptibility genes of small effect (5). ADHD has been consistently associated with both structural (6) and functional (4) brain deficits. This same period witnessed emerging recognition that the disorder frequently continues into adulthood (7), with concomitant expansion of research and clinical interest in adult ADHD. Recent epidemiological evidence suggests that 4.4% of the adults in the United States suffer from ADHD (8). Many findings pertaining to childhood ADHD, including patterns of psychiatric comorbidity, genetics, and brain imaging, have been replicated in adults (9), and virtually all ADHD medications developed in the past decade have shown comparable efficacy and safety in adults as in younger patients.

In spite of these advances, the current DSM provides merely grudging acknowledgment of the adult disorder and asserts that only a "minority experience the full complement of symptoms of attention deficit hyperactivity disorder into mid-adulthood." DSM field trials for ADHD were limited to school-aged children. Although DSM-IV criteria have been adapted for identification of adult patients, significant limitations remain (10). First, the age-of-onset criterion that requires evidence of hyperactive-impulsive or inattentive symptoms with associated impairment before age 7 can be difficult to demonstrate retrospectively in older patients and is inconsistent with evidence from the DSM field trial itself that patients with the inattentive subtype often fail to meet this requirement until age 9 or later. Second, specific symptoms and impairment domains enumerated were selected for their relevance in identification of the disorder in chil-

dren and might not be developmentally sensitive to the range of symptoms and clinical impairments more typical of older patients. Third, symptom thresholds for diagnosis (i.e., having either six of nine inattentive or hyperactive-impulsive symptoms) do not reflect several lines of evidence suggesting that adults with fewer symptoms remain significantly impaired when compared with age-matched peers. Strict adherence to DSM-IV criteria reduces the generalizability of clinical research findings as patients whose symptoms are subthreshold for diagnosis are excluded from clinical studies while, at the same time, potentially denying care to adults who remain impaired from clinically meaningful symptoms.

Two articles by Drs. Biederman, Faraone, and colleagues in this issue of the *Journal* should inform debate on future DSM conceptualizations of ADHD, with a particular view toward adult diagnostic criteria. Faraone and colleagues compared adults with full ADHD criteria with late-onset subjects who met full criteria except onset by age 7, subthreshold subjects exhibiting only three of nine inattentive or hyperactive/impulsive symptoms, and subjects without ADHD. The subjects with late onset had identical patterns of comorbidity, adaptive impairments, and familial transmission as those meeting full criteria. In contrast, subjects with subthreshold ADHD had milder degrees of impairment and a different pattern of familial transmission. These findings cast additional doubt on the validity of the age-of-onset criterion but suggest that current symptom thresholds have value in identifying more adults with more severe disorders. The investigators did not assess alternative ADHD symptoms for adults or other symptom thresholds for diagnosis, but these questions remain fertile ground for future research.

In a second article, Biederman and colleagues assessed adults with and without ADHD for deficits of executive functioning and found that adults with ADHD plus comorbid deficits of executive functioning had significantly worse global impairments than those without. The concept of deficits of executive functioning might be more familiar to neuropsychologists than to many psychiatrists who are used to making diagnoses on the basis of DSM-defined clinical syndromes, and it includes problems in areas of working memory, sustained attention, verbal fluency, and processing speed. Although the authors note current limitations to the routine consideration of deficits of executive functioning in clinical practice, future research on the subset of patients with ADHD and these deficits could potentially identify risk factors, brain mechanisms, and treatment effects that are more specifically relevant to our most disabled patients. The high frequency of deficits of executive functioning in a sample of adults with such a high-prevalence disorder strongly points us to the need to develop and test specific treatments that can address these cognitive deficits. This article illustrates one limitation of our purely descriptive approach to diagnostic classification and suggests there is value in considering underlying brain processes in clinical assessment.

Irrespective of the epidemiological, genetic, neuroimaging, and clinical outcome data, there remains among some practitioners ongoing resistance to recognition of ADHD as an adult phenomenon and reluctance to provide clinically proven treatments. Without validated criteria for adult ADHD, we restrict research to a subset of clearly impaired patients that might have limited generalizability to clinical practice, and we risk errors in clinical assessment with concomitant potential for improper prescription or withholding of appropriate treatment. Future DSM field trials should assess symptoms and domains of impairment that are developmentally appropriate for adults. Symptom thresholds for diagnosis should be established with consideration of adult norms. Consistent with earlier DSM field trials, the age-of-onset criterion should minimally be increased to age 12 or—in the absence of strong empirical support—be abandoned altogether.

The greater question is whether, following the "decade of the brain" and completion of the human genome project, the field of psychiatry is ready to move beyond its descriptive approach to classification and embrace a diagnostic model linked to underlying pathophysiology that is more akin to most of medicine. Battles over nature versus

nurture that necessitated compromise on an "atheoretical" approach to classification have given way to an understanding that all behavior is biological and that this biology arises from genes, environments, and their interactions. Elucidation of various pathways to the clinical syndrome of ADHD could provide a basis for intervention research aimed at primary brain dysfunctions. Success with this approach not only would enhance our ability to address the needs of ADHD patients across the life span but would inform diagnosis and treatment across behavioral disorders.

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