



Adult Onset of ADHD: Myth or Reality

Joseph Biederman, MD

**Professor of Psychiatry
Harvard Medical School**

**Chief, Clinical and Research Programs in
Pediatric Psychopharmacology and Adult ADHD**

**Director, Bressler Program for Autism Spectrum Disorders
Trustees Endowed Chair in Pediatric Psychopharmacology
Massachusetts General Hospital**

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Adult Onset ADHD

- Recent **population based studies** raise the intriguing question as to whether adult ADHD is always preceded by childhood onset of symptoms (hence neurodevelopmental) or can develop anew in adult life

Is Adult ADHD a Childhood-Onset Neurodevelopmental Disorder? Evidence From a Four-Decade Longitudinal Cohort Study

Terrie E. Moffitt, Ph.D., Renate Houts, Ph.D., Philip Asherson, M.D., Daniel W. Belsky, Ph.D., David L. Corcoran, Ph.D., Maggie Hammerle, B.A., HonaLee Harrington, B.A., Sean Hogan, M.S.W., Madeline H. Meier, Ph.D., Guilherme V. Polanczyk, M.D., Richie Poulton, Ph.D., Sandhya Ramrakha, Ph.D., Karen Sugden, Ph.D., Benjamin Williams, B.A., Luis Augusto Rohde, M.D., Avshalom Caspi, Ph.D.

Results: As expected, childhood ADHD had a prevalence of 6% (predominantly male) and was associated with childhood

Objective: To test whether a childhood-onset ADHD picture in a longitudinal cohort of 1,037 individuals aged 17 in 1973 and 47 in 2013, ascertained by psychological diagnoses and setting controls for polygenic risk, childhood neurodevelopmental deficits, and adult ADHD.

Method: A sample of 1,037 individuals aged 17 in 1973 and 47 in 2013, ascertained by psychological diagnoses and setting controls for polygenic risk, childhood neurodevelopmental deficits, and adult ADHD.

Conclusions: The findings raise the possibility that adults presenting with the ADHD symptom picture may not have a childhood-onset neurodevelopmental disorder. If this finding is replicated, then the disorder's place in the classification system must be reconsidered, and research must investigate the etiology of adult ADHD.

... a history of childhood ADHD. Also unexpectedly, the adult ADHD group did not show tested neuropsychological deficits in childhood or adulthood, nor did they show polygenic risk for childhood ADHD.

Results: As expected, childhood ADHD had a prevalence of 6% (predominantly male) and was associated with childhood

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Problems with the Interpretation of The Dunedin Study Findings

- Childhood diagnosis based on informants (parents and teachers)
- Adult diagnosis by self report
- Subjects assessed in childhood and at the age of 38 making it difficult to assess age of onset of adult ADHD cases
- Subsyndromal conditions not assessed
- There were only 31 adult onset cases!!

THE BRAZILIAN STUDY

Original Investigation

Attention-Deficit/Hyperactivity Disorder Trajectories From Childhood to Young Adulthood

RESULTS At 11 years of age, childhood ADHD (C-ADHD) was present in 393 individuals (8.9%). At 18 to 19 years of age, 492 individuals (12.2%) fulfilled all *DSM-5* criteria for young adult ADHD (YA-ADHD), except age at onset. After comorbidities were excluded, the prevalence of

CONCLUSIONS AND RELEVANCE The findings of this study do not support the assumption that adulthood ADHD is necessarily a continuation of childhood ADHD. Rather, they suggest the existence of 2 syndromes that have distinct developmental trajectories.

[55.0%] vs 17.80 [50.47%] male, $P < .001$). Both groups had increased levels of impairment in adulthood, as measured by traffic incidents, criminal behavior, incarceration, suicide attempts, and comorbidities. However, only 60 children (17.2%) with ADHD continued to have ADHD as young adults, and only 60 young adults (12.6%) with ADHD had the disorder in childhood.

using a screening instrument (hyperactivity subscale of the Strength and Difficulties Questionnaire) calibrated for a *DSM-IV* ADHD diagnosis based on clinical interviews with parents using the Development and Well-Being Assessment. At 18 to 19 years of age, ADHD diagnosis was derived using *DSM-5* criteria, except age at onset. We estimated the overlap between these groups assessed at 11 and 18 to 19 years of age and the rates of markers of impairment in these 2 groups compared with those without ADHD.

Brazilian Study Main Findings

- Only 15% of children with ADHD met (full) criteria for ADHD at ages 18-19
- Only 12% of 18-19 year olds with ADHD had the (full) disorder in childhood

Problems with the Interpretation of the Brazilian Study Findings

- ADHD status was ascertained at age 11 **based on clinical interviews with parents**
- ADHD diagnosis at age **18** years was established by **self report** using DSM-5 criteria, except age-of-onset
- Age 18-19 youth can hardly be considered adults

Problems with the Brazilian Study

Conclusions

- Both ADHD groups had **similarly** increased levels of impairment at 18-19, as measured by traffic accidents, criminal records, incarceration, suicide attempt, and comorbidities

THE UK STUDY

Original Investigation

Evaluation of the Persistence, Remission, and Emergence

RESULTS Of 2232 participants in the E-Risk Study, 2040 were included in the present analysis. In total, 247 individuals met diagnostic criteria for childhood ADHD; of these, 54 (21.9%) also met diagnostic criteria for the disorder at age 18 years. Persistence was associated with more symptoms (odds ratio [OR], 1.11 [95% CI, 1.04-1.19]) and lower IQ (OR, 0.98 [95% CI, 0.95-1.00]). At age 18 years, individuals with persistent ADHD had more functional impairment (school/work: OR, 3.30 [95% CI, 2.18-5.00], home/with friends: OR, 6.26 [95% CI, 3.07-12.76]), generalized anxiety disorder (OR, 5.19 [95% CI, 2.01-13.38]), conduct disorder (OR, 2.03 [95% CI, 1.03-3.99]), and marijuana dependence (OR, 2.88 [95% CI, 1.07-7.71]) compared with those whose ADHD remitted. Among 166 individuals with adult ADHD, 112 (67.5%) did not meet criteria for ADHD at any assessment in childhood. Results from logistic regressions indicated that individuals with late-onset ADHD showed fewer externalizing problems (OR, 0.93 [95% CI, 0.91-0.96]) and higher IQ (OR, 1.04 [95% CI, 1.02-1.07]) in childhood compared with the persistent group. However, at age 18 years, those with late-onset ADHD demonstrated comparable ADHD symptoms and impairment as well as similarly elevated rates of mental health disorders.

DSM-IV diagnostic criteria in childhood and *DSM-5* diagnostic criteria in young adulthood.

Interpretation of the UK Study Findings

- **Twin Study**
- Age at follow up: **18 years**
- 22% of individuals with childhood ADHD, also met (full) diagnostic criteria for the disorder at 18 years
- Persistence was associated with **more symptoms, lower IQ, more functional impairment (school/work, home/with friends), GAD, CD and marijuana dependence**

Interpretation of the UK Study Findings

- 68% of individuals with ADHD at age 18 did not meet criteria for (full) ADHD in childhood
- These “late-onset” ADHD cases showed **fewer externalizing problems and higher IQ in childhood**

Interpretation of the UK Study Findings

- **At age 18, early and late-onset ADHD showed comparable ADHD symptoms and impairments as well as similarly elevated rates of mental health disorders**

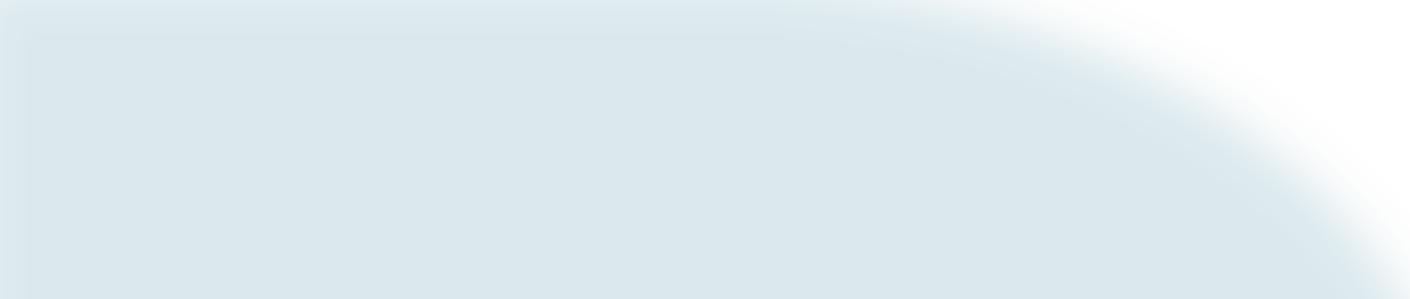
HOW TO UNDERSTAND THESE “ADULT ONSET” ADHD CASES?

How to Understand Adult Onset ADHD?

- The three population based studies propose a paradigmatic shift in our understanding of ADHD
- They suggest that:
 - ADHD can onset in adulthood
 - Childhood onset and adult onset ADHD are distinct syndromes

Adult Onset ADHD: What Does It Mean?

- **The NZ study** argues that adult ADHD **is** **not** a neurodevelopmental disorder”
- **The Brazilian Study** argues that child and adult ADHD are “distinct syndromes”
- **The UK Study** argues that “adult ADHD is more complex than a straightforward continuation of the childhood disorder”



PROBLEMS WITH SELF REPORTS OF ADHD SYMPTOMS IN POPULATION STUDIES

Problem with Self Reports in Population Studies

- Population studies use non-referred samples
- Participants may not always be self-aware of their symptoms increasing the risk of **false negatives**

Self Reports in Clinical Studies

- Self awareness is less of an issue for subjects referring themselves to clinical care since, by definition, it is their self awareness that brings them to the clinic

**WERE THE CHILDHOOD-ONSET CASES
WITHOUT ADULT ADHD DIAGNOSIS
TRULY REMITTERS?**

REVIEW ARTICLE

The age-dependent decline of attention deficit hyperactivity disorder:
a meta-analysis of follow-up studies

STEPHEN V. FARAONE^{1*}, JOSEPH BIEDERMAN^{2,3} AND ERIC MICK^{2,3}

¹ *Medical Genetics Research Program and Department of Psychiatry, SUNY Upstate Medical University,*

Background. This study examined the persistence of attention deficit hyperactivity disorder (ADHD) into adulthood.

ABSTRACT

Results. When we define only those meeting full criteria for ADHD as having ‘persistent ADHD’, the rate of persistence is low, ~15% at age 25 years. But when we include cases consistent with DSM-IV’s definition of ADHD in partial remission, the rate of persistence is much higher, ~65%.

Age-Dependent Decline and Persistence of ADHD Throughout the Lifetime

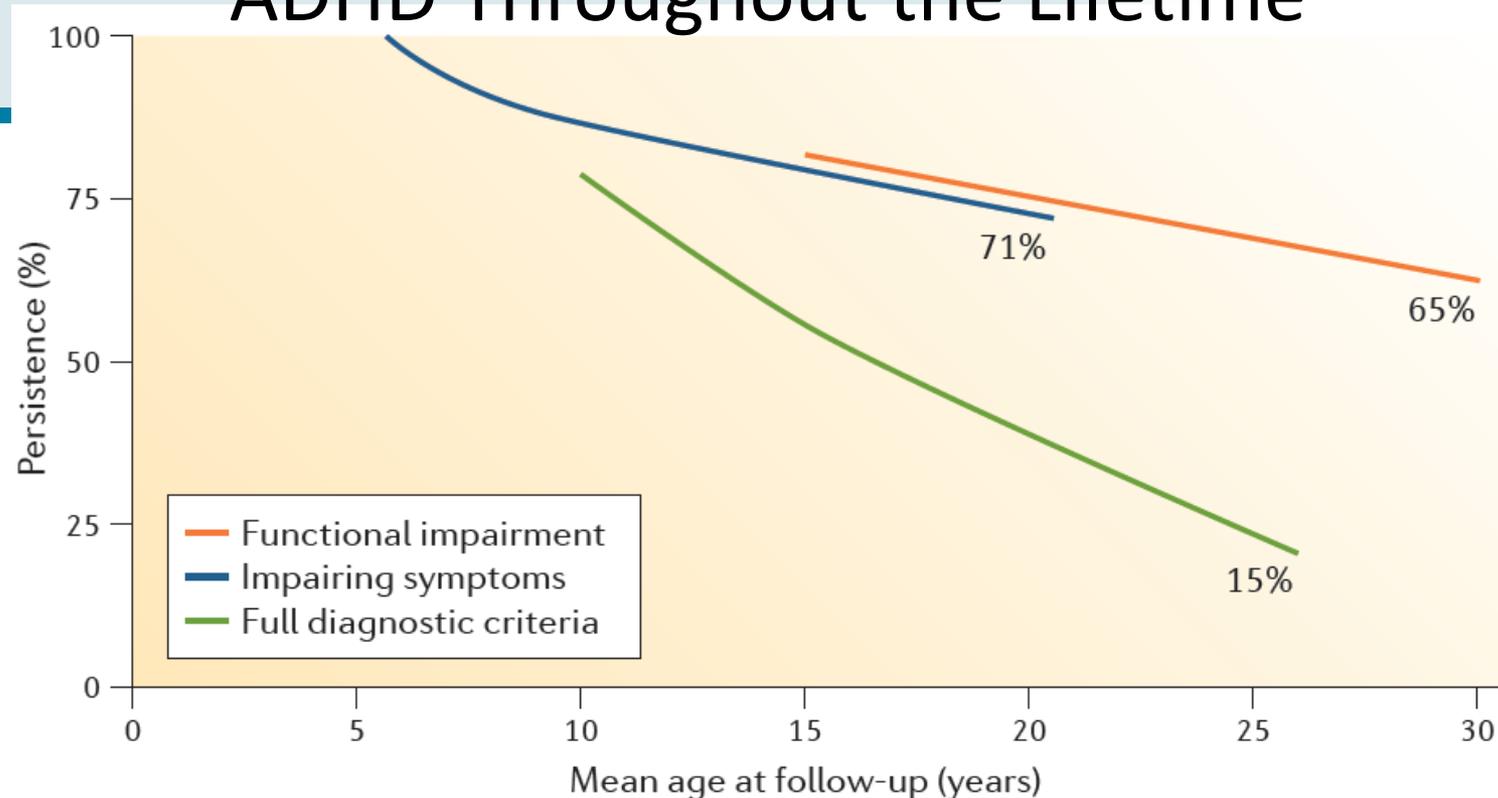


Figure 2 | **The age-dependent decline and persistence of attention-deficit/hyperactivity disorder throughout the lifetime.** Follow-up studies have assessed children with attention-deficit/hyperactivity disorder (ADHD) at multiple time points after their initial diagnosis. Although they document an age-dependent decline in ADHD symptoms, ADHD is also a highly persistent disorder when defined by the persistence of functional impairment⁷ or the persistence of subthreshold (three or fewer) impairing symptoms⁸. By contrast, many patients remit full diagnostic criteria⁷.



ARE THE RATES OF PERSISTENCE OF CHILDHOOD ADHD ATYPICAL?

Adult Onset ADHD

- The persistence of the **full** ADHD disorder of 17%-22% by ages 18-19 years in the Brazilian and UK studies are consistent with the expected rate of persistence of the full disorder in the literature
- **Subsyndromal and functional persistence was not assessed**

Low Persistence of Childhood ADHD in the NZ Study

- Persistence of childhood ADHD in the NZ study was defined as those meeting full diagnostic criteria ignoring the much higher persistence rate of impairing and subsyndromal ADHD symptoms

**ARE THESE ADULT ONSET CASES
REALLY ADULTS?**

Adult Onset ADHD

- The “adults” in the Brazilian and UK studies were 18 or 19 years old
- **This is too small a slice of adulthood to draw firm conclusions about adult onset ADHD**
- The NZ studies assessed subjects in childhood and then at the age of 38 and do not report the age of onset of their adult-onset cases

ISSUE OF REPORTER BIAS

Reporter Bias

- In the three studies while the child diagnosis of ADHD was **informant based** (parents and teachers), the adult diagnosis was based **exclusively on self-report**

**DOES REPORTING SOURCE
MATTER? YES**

The Persistence of Attention-Deficit/Hyperactivity Disorder Into Young Adulthood as a Function of Reporting Source and Definition of Disorder

Russell A. Barkley

Mariellen Fischer and Lori Smallish

This study examined the persistence of attention-deficit/hyperactivity disorder (ADHD) into young adulthood using hyperactive ($N = 147$) and community control ($N = 71$) children evaluated at ages 19–25 years. ADHD was rare in both groups (5% vs. 0%) based on self-report but was substantially higher using parent reports (46% vs. 1.4%). Using a developmentally referenced criterion ($+2 SD$), prevalence remained low for self-reports (12% vs. 10%) but rose further for parent reports (66% vs. 8%). Parent reports were more strongly associated with major life activities than were self-reports. Recollections of childhood ADHD showed moderate correlations with actual parent ratings collected in childhood, which suggests some validity for such recollections. The authors conclude that previous follow-up studies that relied on self-reports might have substantially underestimated the persistence of ADHD into adulthood.

studies that relied on self-reports might have substantially underestimated the persistence of ADHD into adulthood.

When Diagnosing ADHD in Young Adults Emphasize Informant Reports, *DSM* Items, and Impairment

Margaret H. Sibley and William E. Pelham, Jr.

Brooke S. G. Molina

Results: Results indicated that although a majority of young adults with a childhood diagnosis of ADHD continued to experience elevated ADHD symptoms (75%) and clinically significant impairment (60%), only 9.6%–19.7% of the childhood ADHD group continued to meet DSM–IV–TR (DSM, 4th ed., text rev.) criteria for ADHD in young adulthood. Parent report was more diagnostically sensitive than self-report.

Young adults with ADHD tended to underreport current symptoms, while young adults without ADHD tended to overreport symptoms. There was no significant incremental benefit beyond parent report alone to combining self-report with parent report. Non-DSM-based, adult-specific symptoms of ADHD were significantly correlated with functional impairment and endorsed at slightly higher rates than the DSM-IV-TR symptoms. However, DSM-IV-TR items tended to be more predictive of diagnostic group membership than the non-DSM adult-specific items due to elevated control group item endorsement.

Adult Onset ADHD

- Thus, the UK, Brazilian and NZ studies may have underestimated the persistence of ADHD and overestimated the prevalence of adult onsets of ADHD

**IS LATER ONSET ADHD DIFFERENT
FROM EARLIER ONSET ADHD?**

Is Later Onset ADHD Different from Earlier Onset ADHD?

- **In the three population studies, early and late-onset ADHD showed comparable ADHD symptoms and impairment as well as similarly elevated rates of mental health disorders**

Diagnosing Adult Attention Deficit Hyperactivity Disorder: Are Late Onset and Subthreshold Diagnoses Valid?

Stephen V. Faraone
Joseph Biederman,
Thomas Spencer, M.
Eric Mick, Sc.D.
Kate Murray, B.A.
Carter Petty, M.S.
Joel J. Adamson, B.
Michael C. Monutech

Results: Subjects with late-onset and full ADHD had similar patterns of psychiatric comorbidity, functional impairment, and familial transmission. Most children with late onset of ADHD (83%) were younger than 12. Subthreshold ADHD was milder and showed a different pattern of familial transmission than the other forms of ADHD.

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ADHD among relatives
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not meet full symptom criteria for ADHD, and 123 subjects without ADHD who did not meet any criteria. The authors hypothesized that subjects with late-onset and subthreshold ADHD would show patterns of psychiatric comorbidity, functional impairment, and familial transmis-

subthreshold ADHD among such subjects, who reported a lifetime history of some symptoms that never met DSM-IV's threshold for diagnosis. In contrast, the results suggested that late-onset adult ADHD is valid and that DSM-IV's age-at-onset criterion is too stringent.

(*Am J Psychiatry* 2006; 163:1720–1729)

Assessing the Validity of the Age at Onset Criterion for Diagnosing ADHD in DSM-5

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1-11
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sagepub.com/journalsPermissions.nav
DOI: 10.1177/1087054716629717
jad.sagepub.com


Shanel Chandra¹, Joseph Biederman², and Stephen V. Faraone^{1,3}

Results: Compared with non-ADHD participants, all ADHD groups had poorer quality of life and had more impaired social adjustment. Compared with each other, the ADHD groups had similar patterns of psychiatric comorbidity, functional impairment, familial transmission, and intelligence.

5). Although an improvement from the previous age at onset of 7, whether this new criterion is adequate to capture

Method: We compared three groups of adults: (a) ADHD participants who met all *DSM-5 criteria for ADHD* ($n = 182$), (b) *late-onset ADHD participants who met all criteria except for later age at onset* ($n = 17$), and (c) *non-ADHD participants who did not meet criteria for ADHD* ($n = 117$). We assessed patterns of symptoms, psychiatric comorbidity, functional impairment, familial transmission, quality of life, social adjustment, and intelligence.

**DID THE ADULT ONSET CASES TRULY
LACK NEURODEVELOPMENTAL
FEATURES?**

Did the adult onset cases truly lack neurodevelopmental features?

- In the three population based studies, adult onset ADHD was *de novo* only in the sense that full-threshold ADHD had not been diagnosed by the investigators at prior assessments

Did the adult onset cases truly lack neurodevelopmental features?

- In the NZ study, the adult onset ADHD group had more teacher-rated symptoms of ADHD, more conduct disorder (CD) in childhood and were more likely to have had a combined parent/teacher report of ADHD symptom onset prior to age 12 than Controls

Adult Onset ADHD: What Does It Mean?

- Likewise, the adult onset cases in the UK study had significantly elevated rates of ADHD symptoms, CD and oppositional defiant disorder (ODD) in childhood
- In the Brazilian study, 62% of adult onsets had high levels of ADHD and CD symptoms
- Thus, many “adult onsets” of ADHD had clear neurodevelopmental roots

Adult Onset ADHD

- These neurodevelopmental roots point to the existence of subthreshold childhood ADHD, which is impairing in its own right and may also predict subsequent onset of the full-threshold disorder

Adult ADHD

- This view of ADHD posits that symptoms and impairment may emerge due to the accumulation of environmental and genetic risk factors

Adult Onset ADHD

- Such an interpretation would suggest that the etiology of ADHD leads to a wide variability in ages of onset of initial symptoms, symptoms exceeding diagnostic threshold and impairment arising from those symptoms

Adult ADHD

- Those with lower levels of risk at birth will take longer to accumulate sufficient risk factors and longer to onset with symptoms and impairment
- This multifactorial perspective allows for different risk factors to exert effects at different ages thereby influencing age of onset

Adult Onset ADHD

- Because these effects are multifactorial, there is no clean separation of etiologic factors in people above and below the ages of 12 years set forth in DSM-V

Adult Onset ADHD

- Such a scenario may suggest that ADHD may be a disorder with a continuum of ages of onsets, with some subjects starting their symptoms earlier while others later

Adult Onset ADHD

- This hypothesis argues against the idea that childhood onset and adult onset are distinct syndromes

Adult Onset ADHD

- In this context it is important to remember that the age of onset of ADHD of 12 years proposed in DSM-V, while an improvement from the previous age of onset of 7 years, is still completely arbitrary creating the immediate dilemma on how to diagnose patients who have an onset of symptoms after 12 years of age

Adult Onset ADHD

- Moreover, in many cases, the **onset of ADHD symptoms** and **onset of associated impairment** can be separated by many years, particularly among those with strong intellectual abilities and those living in supportive, well-structured childhood environments

Adult Onset ADHD

- Such intellectual and social scaffolding would help some ADHD youth to compensate in early life and manifest only subthreshold symptoms, only to decompensate into a full ADHD syndrome when the scaffolding is removed

Summary

- Results from these population based reports do very little to help clarify whether these “adults” do not recall childhood symptoms, are unable to report on them, or are unable to distinguish onset of symptoms from onset of symptoms-associated impairments that may account for the different ages of onset

Summary

- These concerns do not argue against the existence of adult onset ADHD or the idea that it is not a clinically relevant syndrome
- In fact, as a group, the adult onset cases in the population studies showed significant functional impairments

EDITORIAL

Can Attention-Deficit/Hyperactivity Disorder Onset Occur in Adulthood?

Stephen V. Faraone, PhD; Joseph Biederman, MD

In this issue of *JAMA Psychiatry*, 2 large, longitudinal, population studies from Brazil¹ and the United Kingdom² propose a paradigmatic shift in our understanding of attention-deficit/hyperactivity disorder (ADHD). They conclude, not only that the onset of ADHD can occur in adulthood, but that childhood-onset and adult-onset ADHD may be distinct syndromes.

Prior to these publications, the diagnosis of ADHD in adults had evolved in 2 directions. A meta-analysis³ of longitudinal studies documented an age-dependent decline in the expression of



Related articles

ADHD symptoms. Two-thirds of youth with ADHD continued to have impairing symptoms of ADHD in young adulthood, despite only 15% meeting full diagnostic criteria for the disorder. The Brazilian and UK studies found the expected rate of persistence to ages 18 to 19 years: 17.2% and 21.9%, respectively. A longitudinal population study⁴ from New Zealand observed a 4.9% persistence rate of ADHD to age 38 years. Practitioners take heed: these low rates of cases meeting full diagnostic criteria ignore the much higher persistence rate of impairing ADHD symptoms, which are relevant in clinical practice.³

ability for adult ADHD (35%), which could be a sign of substantial measurement error and false-positive diagnoses. Of further concern, another longitudinal study⁶ found that current symptoms of ADHD were underreported by adults who had had ADHD in childhood and overreported by adults who did not have ADHD in childhood. Because these concerns suggest that the UK, Brazilian, and New Zealand studies may have underestimated the persistence of ADHD and overestimated the prevalence of adult-onset ADHD, it would be a mistake for practitioners to assume that most adults referred to them with ADHD symptoms will not have a history of ADHD in youth.

These concerns do not argue against the existence of adult-onset ADHD or the idea that it is a clinically relevant syndrome. In fact, as a group, the adult-onset cases showed significant functional impairment. Moreover, one of the studies ruled out the idea that adult-onset ADHD is a misdiagnosis of another disorder. Further support for the validity of adult-onset ADHD comes from a study of referred adults who retrospectively reported childhood symptoms.⁷ Based on clinical features and familial transmission, that study concluded that onset of ADHD in late adolescence and early adulthood is valid.⁷