

Assessment and Diagnosis of Adult ADHD: Clinical Challenges and Opportunities for Improving Patient Care

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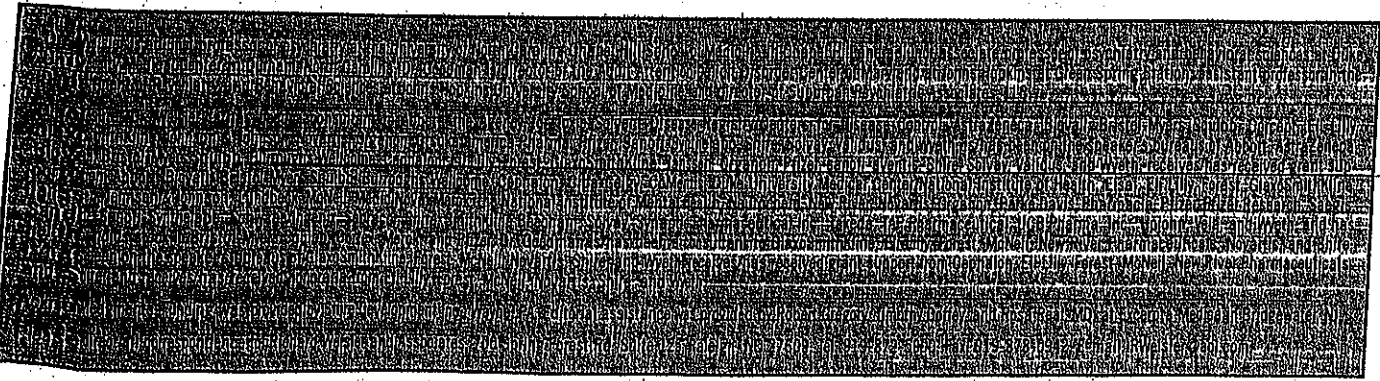
ABSTRACT

Attention-deficit/hyperactivity disorder (ADHD) is commonly perceived as a childhood disorder, but it persists into adulthood in 35% to 70% of affected people. The symptoms, deficits, and consequences associated with ADHD have a profound negative impact on the lives of patients and their families. Barriers to diagnosing ADHD in adults include diagnostic criteria developed and field-tested in children, nonspecificity of symptoms, high incidence of comorbid disorders that could mask or distract from the ADHD diagnosis, variation in presenting symptoms by gender and ethnicity, and lack of definitive diagnostic tools. Given the relatively high prevalence of ADHD compared with other psychiatric disorders, clinicians should maintain a high index of suspicion and integrate screening for ADHD into all routine psychiatric evaluations. Accurate diagnosis requires a comprehensive clinical interview, including evaluation of past and present symptoms and longitudinal course and assessment of functional impairment. It is often necessary to interview or obtain information from family,

FOCUS POINTS

Adult attention deficit/hyperactivity disorder (ADHD) is a complex condition that often goes undiagnosed in adulthood. The clinical challenges in diagnosing ADHD in adults include diagnostic criteria developed and field-tested in children, nonspecificity of symptoms, high incidence of comorbid disorders that could mask or distract from the ADHD diagnosis, variation in presenting symptoms by gender and ethnicity, and lack of definitive diagnostic tools. Given the relatively high prevalence of ADHD compared with other psychiatric disorders, clinicians should maintain a high index of suspicion and integrate screening for ADHD into all routine psychiatric evaluations. Accurate diagnosis requires a comprehensive clinical interview, including evaluation of past and present symptoms and longitudinal course and assessment of functional impairment. It is often necessary to interview or obtain information from family,

friends, coworkers, and old school or test records. A self-awareness of symptoms can be difficult for people who have lived most of their lives with the illness. Comorbid disorders may need to be treated before instituting treatment for ADHD. Education of patients and their families is an important facet of treatment that can improve adherence and optimize outcome. Pharmacologic therapy includes short- and long-acting stimulants as well as



second-line nonstimulant medications. Short-acting stimulants may be inconvenient and have the potential for diversion and misuse. New treatments on the horizon may offer options better fitting the needs of adults with ADHD.

INTRODUCTION

Until recently, attention-deficit/hyperactivity disorder (ADHD) was perceived as primarily a disease of childhood.¹ Thus, diagnostic criteria and guidelines for the assessment, diagnosis, and treatment of ADHD in children are well established.²⁻⁵ ADHD usually becomes evident during childhood, but it persists into adolescence and adulthood in an estimated 35%–70% of cases.⁶⁻⁸ A nationally representative household survey of adults 18–44 years of age conducted in the United States in 2001–2003 reported an estimated 4.4% prevalence for ADHD.⁹ In surveys conducted by the World Health Organization (WHO) from 2001–2003, the prevalence of adult ADHD ranged from 1.2% in Spain to 7.3% in France (and 5.2% in the US).¹⁰

According to national surveys of ambulatory care visits to physicians' offices and outpatient and emergency departments of general and short-stay hospitals, the proportion of adult patients diagnosed with ADHD making these visits increased from 2.1% in 1996–1997 to 3.7% in 2000–2001, and to 6% in 2002–2003.¹¹ The number of prescriptions for ADHD medications has also shown substantial increases. Using pharmacy claims data for 2.5 million participants in prescription benefit plans, Castle and colleagues¹² reported that during the period from 2000–2005, the annual growth rate in ADHD prescriptions for young adults 20–44 years of age was 17% for men and 21.4% for women. In contrast, the increase among children and adolescents ≤19 years of age was 9.5%. Recent data from Verispan¹³ indicates that prescriptions for ADHD medications for adults ≥18 years of age grew steadily from January 2003 through October 2007.

Nevertheless, adult ADHD remains largely underdiagnosed and untreated.^{8-10,14,15} In the US household survey,⁹ only 10.9% of adults with ADHD received any treatment for the disorder during the preceding year.

In spite of the need for diagnosis and management of adult ADHD, primary care physicians (PCPs), who are often an adult's main healthcare provider, have little training in the assessment of adult ADHD.¹⁶ Moreover, numerous psychiatrists have had no training regarding ADHD in adults, despite reports from the 1970s and onward of the persistence of ADHD into adulthood.¹⁷ In a recent survey of 400 PCPs who

regularly treat mental health disorders, 48% reported that they were not confident diagnosing adult ADHD, 44% considered the diagnostic criteria for adult ADHD to be unclear, and 72% reported it was more difficult to diagnose ADHD in adults than in children. Two-thirds deferred to a specialist when diagnosing adult ADHD compared with 2% when diagnosing depression and 3% when diagnosing generalized anxiety disorder.¹⁸

ADHD exerts a substantial toll on the lives of its sufferers and their families.^{1,19} This article explores the social and personal impact of ADHD on the lives of adults with this disorder, and the clinical challenges and opportunities for improving patient care through appropriate diagnosis and treatment.

THE IMPACT OF UNTREATED ADHD ON ADULT LIVES

Functional and Psychological Impairment

ADHD has a wide-ranging impact on adult lives, manifesting as educational, interpersonal, physical, emotional, and work-related difficulties. Controlled studies^{1,20} demonstrate that adults with untreated ADHD have poorer educational performance and attainment, significantly more marriages, greater likelihood of problems making friends, and a higher incidence of interpersonal problems than those without ADHD. Adults with ADHD are also reported to have more symptoms of psychological distress, including hostility, depression, and anxiety, than non-ADHD controls.¹ In the workplace, adults with ADHD are more likely to be fired from or quit a job impulsively, hold a single job for less time, have more job changes in a 10-year period, receive a lower salary, and have poorer work performance scores than their non-ADHD peers.^{1,19-21} In a 2003 national survey of 500 adults with ADHD (mean age=32 years) and 501 sex- and age-matched controls, significantly more psychosocial, educational, and occupational impairments were seen in those with ADHD. They had higher rates of divorce/separation and arrests and were less likely to be optimistic about their futures than non-ADHD controls; 72% felt that ADHD had a lifelong detrimental impact.²⁰

Risky Behaviors

Adults with ADHD may engage in risky or impulsive behaviors.²² They may demonstrate poor driving skills, have suspension or revocation of their driver's license, receive more speeding tickets, and experience more motor vehicle accidents than those without ADHD.^{1,23,24} ADHD is recognized by the National Highway Traffic Administration as a contributing

factor in motor vehicle accidents.²⁵ Because accidents are the leading cause of death among people 16–30 years of age,²⁶ the contribution of ADHD to these accidents adds to an already significant public health risk.

Tobacco use and drug and alcohol abuse are also more common in adults with ADHD than in the general population.^{9,27,28} A longitudinal study of the smoking status of 221 adults who had childhood ADHD reported a daily smoking rate of 35% compared with 16% of non-ADHD age-matched controls.²⁷ In a study of 91 girls with ADHD 6–17 years of age, cigarette smoking was found to be a significant predictor of subsequent alcohol or drug use, abuse, and dependence.²⁹ In the National Comorbidity Survey Replication (NCSR),⁹ those who satisfied criteria for ADHD were 3.0 times more likely to have a substance use disorder and 7.9 times more likely to be drug dependent than adults without ADHD; prevalence of substance use disorder was 15.2% for those with ADHD and 5.6% for those without ADHD ($P < .05$). Although the research is inconclusive, pharmacologic treatment for ADHD appears to reduce the risk of substance abuse.^{30–32}

Adults with ADHD, especially those with comorbid conduct or oppositional defiant disorder histories, are more likely to engage in behaviors resulting in incarceration. In a study at the Utah State Prison of 102 randomized male inmates 16–64 years of age, 26 received a positive diagnosis of ADHD (having significant symptoms both as children and adults). An additional 22 inmates showed varying patterns of ADHD symptoms throughout childhood and adulthood, while seven had exhibited ADHD symptoms only during childhood, and seven showed ADHD symptoms only as adults.³³ Of 129 inmates of a German prison for adolescent and young adult male prisoners, ADHD (using *Diagnostic and Statistical Manual*, Fourth Edition³⁴ criteria) was diagnosed in 45%. Using *International Classification of Diseases—Tenth Edition*³⁵ research criteria (“disturbance of activity and attention” or “hyperkinetic conduct disorder”), the prevalence was 21.7%.³⁶ Conduct disorder and substance abuse are frequently seen with ADHD, but the risk of incarceration associated with ADHD appears to be independent of these comorbid conditions.³⁷

The effects of ADHD may have a different impact on the lives of women than men. Women may receive the diagnosis later in life than men, perhaps because women tend to show more symptoms of inattention than of hyperactivity, the more conspicuous presentation.³⁸ Women often blame themselves for their symptoms, damaging their self-esteem and resulting in depression.^{38,39} Traditional gender roles may also increase the impact of ADHD on women, as they are often employed in addition to being burdened with the multitasking role of family caretaker.³⁸

Comorbidity and Economic Burden

Adults with ADHD are likely to have additional psychiatric and physical disorders.⁴⁰ Comorbid conditions occurring frequently in adults with ADHD include substance/alcohol abuse, as well as mood, anxiety, learning, and personality disorders.^{9,10,41} The WHO epidemiologic surveys ($n=11,422$) reported that adults with ADHD were 4.0 times more likely to have an anxiety disorder, 3.9 times more likely to have a mood disorder, and 7.2 times more likely to have ≥ 3 psychiatric disorders than those without ADHD ($P < .05$).¹⁰ The NCSR ($n=3,199$) reported a prevalence of 38.3% for mood disorder and 47.1% for anxiety disorder among adults with ADHD.⁹ Among adults with bipolar disorder, those who also have ADHD are more likely to attempt suicide than those without ADHD.⁴² Rates of suicide in patients with bipolar disorder are estimated to be 15–22 times greater than in the general population,⁴³ and ADHD can further compound the risks by increasing impulsivity, aggression, cigarette smoking, and substance abuse, which are independent risk factors for suicidality in patients with bipolar disorder.^{44–47} A history of suicide attempt was reported in 15% of 60 young adults with combined-type ADHD and in 3% of 36 young adults with inattentive-type ADHD.⁴⁸ In an Austrian study,⁴⁹ current suicidality was reported in 29% of incarcerated adolescent males diagnosed with ADHD.

Not surprisingly, ADHD poses a significant economic burden in terms of medical costs and work loss.^{21,41,50} Total excess healthcare and work-loss costs of childhood and adult ADHD in the US in 2000 were estimated to be \$31.6 billion, of which \$19.5 billion was directly attributed to excess healthcare costs for ADHD adults and their families, many of whom also incur additional healthcare expenses as a result of the ADHD of their impaired family member.⁵⁰ Loss of workforce productivity due to ADHD among adults 18–64 years of age was estimated to be \$67–\$116 billion in 2003.²¹

CHALLENGES IN THE DIAGNOSIS OF ADULT ADHD

Shortcomings of DSM-IV-TR Criteria

There are numerous challenges to the correct diagnosis of ADHD in adults, particularly among those undiagnosed during childhood.^{51,52} Some of these challenges are related to the diagnostic criteria listed in the *DSM-IV-TR*.²² These require that patients have six of nine symptoms of either inattention or hyperactivity-impulsivity present for ≥ 6 months, have onset of

symptoms before 7 years of age, impairment from the symptoms present in ≥ 2 settings (eg, work and home), and impaired social, academic, or occupational functioning (Table 1).²²

The ADHD criteria of the *DSM-IV-TR* focuses on childhood expression of symptoms that may have limited applicability in adults; in fact, these criteria have never been validated in adults.^{14,15,53} Developmental, social, and environmental differences between children and adults affect the way in which symptoms manifest. For example, hyperactivity in children may be seen more as restlessness in adulthood; a child who squirmed, ran, or climbed might, as an adult, choose a physically demanding job or work excessively long hours.^{8,16,22} Thus, adult symptoms may be masked by compensatory choices in life situations or by development of coping skills that mitigate impairment. Further, symptoms may become apparent only in more challenging situations, such as at home with its demands for multitasking, and be less prominent in a work environment chosen for its suitability for ADHD.^{16,54} Adaptive skills, intelligence quotient, and environmental demands may make it difficult to enumerate the six of nine symptom criteria or to validate the two-domain criterion of the *DSM-IV-TR*. This adds to the need to revisit the conceptualization of ADHD subtypes in adults.

Because the *DSM-IV-TR* indicates that impairments from ADHD must have an onset during childhood, diagnosis involves establishing the presence of symptoms during childhood as well as assessing current impairment.²² The *DSM-IV-TR* requirement for manifestation of symptoms before 7 years of age relies on parental, peer, or self-memories of childhood occurrences or records for verification. Records, however, may be unclear, unavailable, or incomplete.^{22,51} Research indicates that retrospective diagnosis of childhood symptoms via self-rating by adults is a valid approach to meeting the *DSM-IV-TR* criterion of childhood onset.^{55,56} However, the necessity for symptoms before 7 years of age has come under question. A recent study identified a group of 79 adults who fulfilled all criteria for ADHD except for onset of symptoms before 7 years of age. Eighty-three percent recalled first symptoms between 7 and 12 years of age, and the other 17% had onset in adolescence or even adulthood.¹⁵ In a 20-year prospective follow up of adults diagnosed with ADHD by 6 years of age, their retrospective self-report age of onset was ≥ 4 years later than when it actually occurred.⁵⁷ Thus, many adults with ADHD may not recall symptoms before 7 years of age, but most can recall symptoms by 12 years of age. The *DSM-IV-TR* would classify these patients as having a diagnosis of ADHD not otherwise specified (NOS) because they do not fulfill the age-at-onset criterion for ADHD.²² Gathering additional ADHD impairment data from family, friends, and school records from before 7 years of

TABLE 1

DSM-IV CRITERIA FOR ADHD²²

I. Either A or B

A: ≥ 6 of the following symptoms of inattention have been present for ≥ 6 months to an extent that is disruptive and inappropriate for developmental level:

- Often does not give close attention to details or makes careless mistakes in work or other activities
- Often has trouble keeping attention on tasks or play activities
- Often does not seem to listen when spoken to directly
- Often does not follow instructions and fails to finish duties in the workplace (not due to oppositional behavior or failure to understand instructions)
- Often has trouble organizing activities
- Often avoids, dislikes, or does not want to do things that take a lot of mental effort for a long period of time
- Often loses things needed for tasks and activities
- Is often easily distracted
- Is often forgetful in daily activities

B: ≥ 6 of the following symptoms of hyperactivity-impulsivity have been present for ≥ 6 months to an extent that is disruptive and inappropriate for developmental level:

Hyperactivity

- Often fidgets or squirms in seat
- Often gets up from seat when remaining in seat is expected
- Often feels very restless
- Often has trouble enjoying leisure activities quietly
- Is often "on the go" or often acts as if "driven by a motor"
- Often talks excessively

Impulsivity

- Often blurts out answers before questions have been finished
- Often has trouble waiting one's turn
- Often interrupts or intrudes on others

iii. Some impairment from the symptoms is present in ≥ 2 settings (eg, at school, work, and home).

V. The symptoms do not happen only during the course of a pervasive developmental disorder, schizophrenia, or other psychotic disorder, and the symptoms are not better accounted for by another mental disorder

DSM-IV=Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition; ADHD=attention-deficit/hyperactivity disorder.

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age can be helpful in many cases. It is important to remember that patients classified as having a diagnosis of ADHD NOS will also usually respond to approved treatments, as recently reported by Biederman and colleagues.⁵⁸ In an open-label trial in 36 adults with late-onset ADHD NOS, an extended-release preparation of methylphenidate was associated with statistical and clinical improvement of ADHD symptoms.

Gender and Cultural Differences

Differences in ADHD presentation based on culture and gender pose another diagnostic challenge. As noted above, ADHD in adults occurs across ethnic groups and nationalities.^{9,10} However, the perceived importance of symptoms, or extent of impairment, may vary according to the cultural or family environment, and may affect what the patient and family consider problematic behaviors worth reporting to the clinician.^{8,59}

Prevalence of ADHD is higher in boys than girls, with reported ratios of 2:1–9:1.²² Boys are more likely than girls to have the hyperactive subtype, learning disabilities, school behavior problems, and conduct or oppositional-defiant disorder.⁶⁰ Among adults, the male to female ratio is reported to be approximately 3:2,⁹ and the expression of the disorder is similar in both sexes.⁶¹ However, because women may be less likely to have had ADHD diagnosed in childhood because of the absence or reduced intensity of hyperactive, disruptive behavior, they may require more effort to diagnose as adults. Moreover, numerous clinicians have a mistaken bias about ADHD being only a “male disease.”

Nonspecificity of Symptoms and Comorbidity

The diagnosis of ADHD requires the presence of six of nine symptoms of inattention or hyperactivity-impulsivity, but the individual symptoms in adults are nonspecific (ie, they are present in many healthy adults and may be seen in other psychiatric disorders such as major depressive disorder, mania, and generalized anxiety disorder).⁵² Shared and distinguishing features for ADHD and some common psychiatric illnesses are listed in Table 2.^{16,53} The presence of comorbid psychiatric disorders can mask or modify the presentation of ADHD symptoms, further complicating the diagnostic process.^{53,62} Adults may complain of symptoms of the comorbid disorder, which may be of new onset, while not mentioning symptoms of ADHD because these have been present since childhood and are not recognized as abnormal.¹⁶ Clinicians may then focus on the presenting diagnosed comorbid disorder and fail to identify or treat the underlying ADHD, potentially compromising treatment efficacy.

Inadequacy of Diagnostic Instruments

There is no accepted standardized diagnostic instrument for validation of adult ADHD compared with those available for other psychological disorders.⁹ Although current rating scales and neuropsychologic tests are cost-effective and helpful in assessing current symptoms in adults with suspected ADHD,^{8,51} results must be considered in light of the patient's history. Interpretation of the self-report instruments requires proper training because adult psychopathology can distort perception on rating scales, and some self-report scales have poor specificity.⁵² Neuropsychologic testing, imaging, and laboratory tests can be helpful in understanding the cognitive and neural process underlying ADHD, but individual variability is such that they are not definitive for diagnosis and may add unnecessary costs.^{14,63,64}

TABLE 2
ADHD COMORBIDITIES AND PRESENTING SYMPTOMS^{16,53}

Psychiatric Disorder	Shared Features	Differential Features
Bipolar disorder	Hyperactivity; difficulty with attention and focus; mood swings	Enduring dysphoric or euphoric mood; insomnia; delusions
Substance abuse or dependence	Difficulties with attention, concentration, and memory; mood swings	Pathologic pattern of substance use with social consequences; physiologic and psychologic tolerance and withdrawal
Mild Asperger's disorder	Talkativeness; interrupting; inattentiveness	Narrow or prescribed focus on one or very few subjects to the exclusion of normal daily life; lack of sociability; inability to “read” faces and social clues

Searight HR, Burke JM, Rottnek F. Adult ADHD: evaluation and treatment in family medicine. *Am Fam Physician*. 2000;62(9):2077-2086,2091-2092. Adapted with permission from the American Academy of Family Physicians. Copyright 2000.

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MAKING THE CORRECT DIAGNOSIS

Maintaining a high index of suspicion for the presence of ADHD in adults is a key aspect in making a correct diagnosis. Because of the high prevalence of adult ADHD relative to other major psychiatric disorders, screening for the disorder should be part of a comprehensive psychiatric evaluation.³ A useful screening tool is the WHO Adult ADHD Self-Report Scale Screener, a six-item subset (four inattentive and two hyperactive-impulsive) of the 18-question Adult Self-Report Scale (ASRS; Table 3).⁶⁵ In a sample of 154 respondents who reported a diagnosis of childhood ADHD and persistence into adulthood, the six questions from Part A of the ASRS were found to be the most predictive of ADHD. This questionnaire has 65% sensitivity and 94% specificity for adult ADHD when a cut-off of 14 out of a total of 24 points is used.⁶⁶

After screening, accurate diagnosis of ADHD requires a multifaceted approach including assessments of history, present symptoms, and functional impairment (Table 4).^{15,40,51,53} An accurate diagnosis requires sufficient presenting symptoms from the patient, with a pervasive course since childhood, and confirmation of childhood symptoms by an outside informant. Family history of ADHD further strengthens the diagnosis. The clinical interview should include a medical, educational, developmental, social, family, and psychological history. Interviewing fam-

ily members greatly improves the clinician's ability to correctly identify ADHD, as others often remember impairments that the patient has forgotten or failed to recognize. It can also be helpful to obtain school records to identify or corroborate childhood manifestations of ADHD.⁴⁰ However, valuable supplementary information from family members or school records may often be somewhat difficult to obtain for adult patients no longer residing near their parents or schools.

Several standardized tools are useful in assessing adults with ADHD (Table 5).^{8,67} Diagnostic scales are either clinician administered (Conners Adult ADHD Diagnostic Interview, Brown ADD Scale Diagnostic Form, Brown ADD Scale) or self-reported (Barkley's Current Symptoms Scales, which include evaluation by a family member). These tools vary with respect to whether they evaluate only current symptoms or include functional assessment and prior symptoms. Response to pharmacotherapy, psychotherapy, or both can be monitored by using the assessment scales through the course of treatment to evaluate target symptom changes.

Neuropsychologic deficits, including those of executive function, have been demonstrated in multiple studies of adults with ADHD, although results are heterogeneous across tests and patients.^{64,68,69} Executive dysfunction, evident in children with ADHD, has been shown to persist unchanged into young adulthood⁷⁰ and has been reported to occur in adults with ADHD.⁷¹

TABLE 3
ASRS-V1.1 SCREENER⁶⁵

Check the box that best describes how you have felt and conducted yourself over the past 6 months. Please give the completed questionnaire to your healthcare professional during your next appointment to discuss the results.

1. How often do you have trouble wrapping up the final details of a project, once the challenging parts have been done?
2. How often do you have difficulty getting things in order when you have to do a task that requires organization?
3. How often do you have problems remembering appointments or obligations?
4. When you have a task that requires a lot of thought, how often do you avoid or delay getting started?
5. How often do you fidget or squirm with your hands or feet when you have to sit down for a long time?
6. How often do you feel overly active and compelled to do things, like you were driven by a motor?

	Never	Rarely	Sometimes	Often	Very Often
1. How often do you have trouble wrapping up the final details of a project, once the challenging parts have been done?					
2. How often do you have difficulty getting things in order when you have to do a task that requires organization?					
3. How often do you have problems remembering appointments or obligations?					
4. When you have a task that requires a lot of thought, how often do you avoid or delay getting started?					
5. How often do you fidget or squirm with your hands or feet when you have to sit down for a long time?					
6. How often do you feel overly active and compelled to do things, like you were driven by a motor?					

Add the number of checkmarks that appear in the darkly shaded area. Four (4) or more checkmarks indicate that your symptoms may be consistent with adult ADHD. It may be beneficial for you to talk with your healthcare provider about an evaluation.

The six-question ASRS-V1.1 Screener is a subset of the WHO's 18-question Adult ADHD Self-Report Scale-Version 1.1.

ASRS-V1.1=Adult Self-Report Scale-Version 1.1; ADHD=attention-deficit/hyperactivity disorder; WHO=World Health Organization.

Adult ADHD Self-Report Scale-V1.1 (ASRS-V1.1) Screener from WHO Composite International Diagnostic Interview, 2003. Adapted with permission from the World Health Organization. Copyright 2003.

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