

## ADULTS WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER AND SUBSTANCE USE DISORDERS

Attention deficit hyperactivity disorder (ADHD) is one of the most common childhood mental disorders, and it can persist through adolescence and adulthood. The medications most commonly used to treat ADHD are stimulants, and survey data show that abuse of prescription stimulants is on the rise. This *Advisory* discusses the co-occurrence of ADHD and substance use disorders (SUDs), the misuse of prescription stimulants, and treatment and prevention approaches to these problems.

### The Definition of ADHD

According to the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; DSM-5),<sup>1</sup> the essential feature of ADHD is a persistent pattern of inattention, hyperactivity-impulsivity (they are grouped together), or both that interferes with normal functioning and development.<sup>1</sup>

The manifestations of inattention include wandering off task, lacking persistence, and being disorganized.<sup>1</sup> Hyperactivity includes fidgeting, tapping, and talkativeness. Impulsivity is a tendency toward heedless, hasty action. (See Exhibit 1 for DSM-5 ADHD diagnostic criteria.)

Which ADHD symptoms are most prominent varies with age and circumstance. The hyperactivity symptoms are usually the most noticeable during the preschool and elementary school years. Late in elementary and middle school, the inattention symptoms come to the fore.<sup>2</sup> Among adolescents, hyperactivity may be limited to fidgeting and be experienced as feelings of jitteriness and impatience. DSM-5 notes that ADHD symptoms wax and wane depending on the circumstance. Close supervision, a new setting, an engrossing activity, or frequent rewards for appropriate behavior may make symptoms go away temporarily.<sup>1</sup>

### Adult ADHD

For many years, experts believed that children and adolescents outgrew ADHD.<sup>3</sup> However, research that followed children with ADHD into adulthood showed that the condition can persist into adulthood. Depending on the criteria used to define ADHD, anywhere from 15 percent (if the full criteria are used) to 65 percent (if cases classified as being in partial remission are included) of children and adolescents with ADHD continue to have the disorder when they are young adults, according to one meta-analysis.<sup>4</sup>

### How Common Is ADHD?

International studies have shown that about 5 percent of children and adolescents have ADHD.<sup>5</sup> The prevalence among adults is about half that, or between 2 percent and 3.5 percent.<sup>1,6</sup> In the United States, the number of children and adolescents diagnosed with ADHD has been climbing fast. In 2011, 11 percent of children and adolescents had been diagnosed with ADHD at some time in their lives, a 42-percent increase from 2003.<sup>7</sup>

## Exhibit 1. DSM-5 Diagnostic Criteria for ADHD

A. A persistent pattern of inattention and/or hyperactivity-impulsivity that interferes with functioning or development, as characterized by (1) and/or (2):

1. **Inattention:** Six (or more) of the following symptoms have persisted for at least 6 months to a degree that is inconsistent with developmental level and that negatively impacts directly on social and academic/occupational activities:

**Note:** The symptoms are not solely a manifestation of oppositional behavior, defiance, hostility, or failure to understand tasks or instructions. For older adolescents and adults (age 17 and older), at least five symptoms are required.

- a. Often fails to give close attention to details or makes careless mistakes in schoolwork, at work, or during other activities (e.g., overlooks or misses details, work is inaccurate).
  - b. Often has difficulty sustaining attention in tasks or play activities (e.g., has difficulty remaining focused during lectures, conversations, or lengthy reading).
  - c. Often does not seem to listen when spoken to directly (e.g., mind seems elsewhere, even in the absence of any obvious distraction).
  - d. Often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (e.g., starts tasks but quickly loses focus and is easily sidetracked).
  - e. Often has difficulty organizing tasks and activities (e.g., difficulty managing sequential tasks; difficulty keeping materials and belongings in order; messy, disorganized work; has poor time management; fails to meet deadlines).
  - f. Often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort (e.g., schoolwork or homework; for older adolescents and adults, preparing reports, completing forms, reviewing lengthy papers).
  - g. Often loses things necessary for tasks or activities (e.g., school materials, pencils, books, tools, wallets, keys, paperwork, eyeglasses, mobile telephones).
  - h. Is often easily distracted by extraneous stimuli (for older adolescents and adults, may include unrelated thoughts).
  - i. Is often forgetful in daily activities (e.g., doing chores, running errands; for older adolescents and adults, returning calls, paying bills, keeping appointments).
2. **Hyperactivity and impulsivity:** Six (or more) of the following symptoms have persisted for at least 6 months to a degree that is inconsistent with developmental level and that negatively impacts directly on social and academic/occupational activities:

**Note:** The symptoms are not solely a manifestation of oppositional behavior, defiance, hostility, or a failure to understand tasks or instructions. For older adolescents and adults (age 17 and older), at least five symptoms are required.

- a. Often fidgets with or taps hands or feet or squirms in seat.
  - b. Often leaves seat in situations when remaining seated is expected (e.g., leaves his or her place in the classroom, in the office or other workplace, or in other situations that require remaining in place).
  - c. Often runs about or climbs in situations where it is inappropriate. (**Note:** In adolescents or adults, may be limited to feeling restless.)
  - d. Often unable to play or engage in leisure activities quietly.
  - e. Is often “on the go,” acting as if “driven by a motor” (e.g., is unable to be or uncomfortable being still for extended time, as in restaurants, meetings; may be experienced by others as being restless or difficult to keep up with).
  - f. Often talks excessively.
  - g. Often blurts out an answer before a question has been completed (e.g., completes people’s sentences; cannot wait for turn in conversation).
  - h. Often has difficulty waiting his or her turn (e.g., while waiting in line).
  - i. Often interrupts or intrudes on others (e.g., butts into conversations, games, or activities; may start using other people’s things without asking or receiving permission; for adolescents and adults, may intrude into or take over what others are doing).
- B. Several inattentive or hyperactive-impulsive symptoms were present prior to age 12 years.
- C. Several inattentive or hyperactive-impulsive symptoms are present in two or more settings (e.g., at home, school, or work; with friends or relatives; in other activities).
- D. There is clear evidence that the symptoms interfere with, or reduce the quality of, social, academic, or occupational functioning.
- E. The symptoms do not occur exclusively during the course of schizophrenia or another psychotic disorder and are not better explained by another mental disorder (e.g., mood disorder, anxiety disorder, dissociative disorder, personality disorder, substance intoxication or withdrawal).

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In most instances, the hyperactivity and impulsivity symptoms taper off with age.<sup>8</sup> Most adults with ADHD struggle mainly with the manifestations of inattention, including disorganization, forgetfulness, unreliability, and difficulties with planning, task completion, and time management.<sup>9</sup> In middle-aged<sup>9</sup> and older adults,<sup>10</sup> the occurrence of depression and anxiety symptoms increases as the number of ADHD symptoms increases. Studies have found that adolescents and adults with ADHD have higher rates of driving-related problems (e.g., tickets, accidents) than their peers without ADHD.<sup>11,12</sup> Other studies have found an association between ADHD and some psychopathic traits (e.g., blame externalization, rebellious nonconformity,<sup>13</sup> antisocial behavior<sup>14,15,16</sup>). In fact, adult ADHD is associated with problems in many spheres of life, including work (unemployment), education (low attainment), and interpersonal relationships.<sup>14</sup>

## Treatment of ADHD

ADHD is treated with several different kinds of stimulant medications, including:

- Methylphenidate (Concerta, Daytrana, Metadate, Methylin, Quillivant XR, Ritalin).
- Dexmethylphenidate (Focalin).
- Dextroamphetamine (Dexedrine, ProCentra).
- Dextroamphetamine-amphetamine (Adderall).
- Lisdexamphetamine dimesylate (Vyvanse).

Stimulant medications are available in immediate-release and sustained-release formulations. The immediate-release formulations control ADHD symptoms for 3 to 4 hours before wearing off.<sup>17</sup> The sustained-release pills—also known as controlled- and extended-release—control symptoms for 6 to 10 hours.<sup>17</sup> Controlled studies have found that from 65 percent to 75 percent of children and adolescents respond to a single stimulant medication,<sup>18</sup> and as many as 85 percent may respond when more than one stimulant is used.<sup>19</sup> Studies have shown variability in the adult response rate to stimulant medications,<sup>20</sup> but,

on average, it is about the same as the response rate of children and adolescents.<sup>17</sup>

ADHD is also treated with nonstimulant medications. The nonstimulant medications approved by the Food and Drug Administration (FDA) include atomoxetine (Strattera) and extended-release forms of guanfacine (Intuniv) and clonidine (Kapvay). Atomoxetine is approved as a treatment for ADHD for people of all age groups; extended-release guanfacine and clonidine are approved for use by children and adolescents.

Nonstimulant medications may be an alternative for people with ADHD for whom prescription stimulants are ineffective, cause intolerable side effects, or are contraindicated because of another medical condition.<sup>21,22</sup> Whether nonstimulants are as effective as stimulants at controlling ADHD symptoms is an open question. Research involving direct comparisons of stimulant and nonstimulant medication is lacking. Evidence from existing studies and meta-analyses suggests that nonstimulants may not be as effective, but some experts say longer studies might show otherwise, because nonstimulants take several weeks to become fully effective.<sup>22</sup>

Behavioral therapy is also a recognized part of ADHD treatment. Adding cognitive-behavioral therapy (CBT) to medication can be an effective treatment strategy for adults with ADHD.<sup>23</sup> CBT helps people with ADHD by making them more aware of the symptoms and providing some coping techniques.<sup>23</sup>

## Substance Use Disorders Among Adults With ADHD

Studies have found that adults with ADHD are more likely than their peers without ADHD to develop an SUD sometime during their lives.<sup>24,25,26,27</sup> For example, one large epidemiological study (the National Comorbidity Survey Replication [NCS-R])<sup>28</sup> found that 15.2 percent of adults with

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ADHD also met criteria for an SUD, compared with 5.6 percent of adults without ADHD. Substance use typically begins earlier,<sup>25,27</sup> SUD remission rates are slower,<sup>29</sup> and the risks of attempted suicide are greater in those with co-occurring SUDs and ADHD compared with those without ADHD.<sup>30</sup> In addition, the transition to more severe substance use is more likely to occur if someone with an SUD also has ADHD.<sup>25</sup> Research has also suggested that as the severity of ADHD increases, so might the SUD risk. In a recent analysis of data from the National Epidemiologic Survey on Alcohol and Related Conditions, each additional ADHD symptom before age 18 was associated with a greater lifetime chance of developing substance dependence.<sup>31</sup>

Although there is no definitive evidence that explains the relationship between ADHD and susceptibility to developing SUDs, several hypotheses have been proposed, including the following:

- Poor executive functioning is intrinsic to ADHD, so when adolescents and young adults with ADHD are exposed to alcohol, tobacco, and illicit drugs, they lack self-restraint and are more likely to use substances heavily.<sup>32</sup>
- ADHD often leads to demoralization and failure, factors commonly associated with SUDs in adolescents.<sup>33</sup>
- Studies have shown that the reward system in the brain may be impaired in people with ADHD. Nicotine and cocaine may activate that system in ways that produce effects similar to those of stimulant medications used to treat ADHD.<sup>34</sup>
- Misuse of alcohol and marijuana by people with ADHD may be an attempt to alleviate the tense feelings that can accompany the disorder.<sup>35</sup>
- Disorders involving externalizing pathology, such as ADHD, antisocial behavior, and SUDs may be related to shared genetic risk factors.<sup>36</sup>

Some research suggests that ADHD increases the risk of substance use especially when it co-occurs with conduct disorder,<sup>34,37</sup> a mental disorder of children and adolescents characterized by behavior that violates social norms (e.g., bullying, stealing, destruction of property).<sup>1</sup>

## College Students, ADHD, and SUDs

Studies have shown that between 2 percent and 8 percent of college students have ADHD.<sup>32</sup> College students with the disorder tend to struggle academically and also have difficulty making use of study aids, test strategies, and time management techniques that might help them do better.<sup>38</sup>

Studies of college students with ADHD have found associations between the condition and increased tobacco and marijuana use.<sup>39,40</sup> Research findings on whether ADHD is related to alcohol abuse among college students have been inconsistent.<sup>32</sup>

One of the major concerns about prescribing stimulant medications for children with ADHD is that the stimulants may lead to an increased risk of developing an SUD later on. Some research has shown just the opposite: that starting stimulant therapy earlier lowers this risk, perhaps because early stimulant therapy alters brain development.<sup>41</sup> However, a meta-analysis published in 2013 that included 15 studies found that use of stimulant medication by children and adolescents neither protected against nor increased risk for SUDs later in life.<sup>42</sup>

## ADHD Among Adults With Substance Use Disorders

Research on ADHD prevalence among those with SUDs has produced widely varying results. The

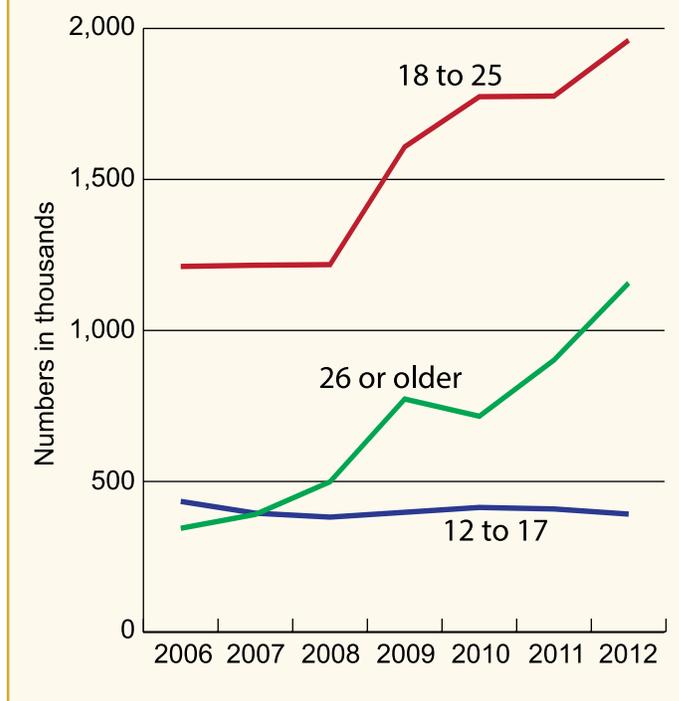
NCS-R<sup>28</sup> found that among adults with an SUD, 10.8 percent met criteria for ADHD, compared with an ADHD prevalence of 3.8 percent in adults without an SUD. When Australian researchers screened people who use cocaine and methamphetamine, they found that 45 percent of them had ADHD symptoms.<sup>43</sup> A study conducted in Spain found that about 20 percent of treatment-seeking cocaine users had “probable ADHD” based on a screening test,<sup>44</sup> and a study of patients at alcohol and drug detoxification facilities in London found that 12 percent had undiagnosed ADHD.<sup>45</sup> A meta-analysis published in 2012 that included 29 studies found that 23 percent of all SUD subjects had ADHD.<sup>35</sup>

## Misuse of Prescription Stimulant Medications

Prescription stimulants can give people a euphoric high and are often misused to improve concentration and alertness. Large doses can be dangerous, resulting in psychosis, seizures, heart attacks, and strokes.<sup>46</sup> On college campuses, prescription stimulants are sometimes called “smart pills.” Social media researchers looking at Twitter messages originating from areas where colleges are located have found that the number of messages mentioning “Adderall” peaks during exam periods.<sup>47</sup>

Studies have found that college students misuse dextroamphetamine-amphetamine more than other prescription stimulants.<sup>48,49</sup> According to the 2012 National Survey on Drug Use and Health, during the past several years the nonmedical use of dextroamphetamine-amphetamine has risen sharply among both college-aged adults and adults ages 26 and older (see Exhibit 2).

**Exhibit 2. Nonmedical Use of Adderall in the Past Year, by Age Group<sup>50</sup>**



## Misuse of prescribed stimulants by people with a prescription

Studies of people with ADHD have found that a sizable minority (up to about a quarter) misuse their medications, usually by taking more than the prescribed dose.<sup>51,52</sup> A small study of college students found that those who reported misusing their stimulant medication were more likely to score higher on sensation-seeking measures and to report recreational use of nicotine, marijuana, hallucinogens, opioids, and cocaine than those who reported that they had not misused their medication.<sup>53</sup> Misuse has also been associated with greater hyperactivity and impulsivity.<sup>54</sup>

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## Misuse of prescribed stimulants by people without a prescription

Much of the research into misuse of prescribed stimulants by people without a prescription has focused on college students. Studies have found that between 4 percent and 20 percent of college students have used a prescription stimulant without having a legitimate prescription in the past year.<sup>55</sup> Many students obtain prescription stimulants from friends, who either sell their medications or give them away. Roughly a third of college students with ADHD report that they have sold or given away their medication at least once.<sup>56</sup> Research has suggested that fraternity and sorority members are at greater risk than other students of using prescription stimulants without a prescription;<sup>57</sup> one study conducted at a large public university in the Southeast found that 55 percent of fraternity members had used prescription stimulants without a prescription.<sup>58</sup>

The main motivation students give for using diverted prescription stimulants is to improve school performance, with recreational use a distant second. In a survey of 4,580 college students, improving concentration (65 percent) and help with studying (60 percent) were the two most common reasons given for misusing prescription stimulants. About half as many (31 percent) listed getting high as a reason.<sup>49</sup> However, there is currently no evidence that the use of prescription stimulants among students without ADHD improves their academic performance.<sup>59</sup>

Research has shown that people who habitually use diverted stimulant medication are more likely to have ADHD symptoms, so some students misusing prescribed stimulants may be self-medicating undiagnosed ADHD.<sup>60</sup> Researchers have also found an association between use of diverted prescription stimulants and depression among adolescents and young adults.<sup>61</sup>

The different stimulant medications vary in how much they are misused. Surveys have indicated that dextroamphetamine-amphetamine is misused more often than the methylphenidate medications.<sup>49,60</sup> Dextroamphetamine-amphetamine is more stimulating<sup>62</sup> and stays in the body longer<sup>17</sup> than methylphenidate.

People who want a euphoric high from prescription stimulants may seek out the immediate-release formulations because they can be crushed and administered intranasally. The extended-release formulations of the stimulant medications are less likely than the immediate-release versions to be misused because the former are difficult to administer intranasally or via injection.<sup>33,34</sup>

## Screening for ADHD in Adults

ADHD can be difficult to distinguish from SUDs because some of the presenting symptoms—restlessness, emotional dysregulation, impulsivity—are the same.<sup>63</sup> It can also be difficult to distinguish between ADHD and bipolar disorder.<sup>64</sup> When ADHD co-occurs with SUDs or mental disorders, the complexities only increase. These complexities reinforce the importance of collaboration between the medical and behavioral health services professionals who provide treatment to individuals with these co-occurring disorders. For example, clients may see behavioral health professionals more frequently than they see medical providers; consequently, behavioral health professionals may become aware first of new symptoms, medication side effects, or other problems requiring medical attention.

Screening for ADHD in people seeking treatment for an SUD can help clinicians make appropriate referrals for professional assessment, diagnosis, and evidence-based ADHD treatments. Below are two examples of screening tools.

### **Adult ADHD Self-Report Scale-V1.1 (ASRS-V1.1)**

**Screeners.** This six-question screening test<sup>65</sup> has been endorsed by the World Health Organization and is used in epidemiological research. One of the major advantages of this screening test is brevity; it takes only about a minute, on average, to complete.<sup>66</sup> However, the test asks only about the presence of symptoms; it does not determine whether they began in childhood, which is an essential component of the official ADHD diagnosis. In a large international study of adults seeking treatment for SUDs, the test was better at ruling out ADHD than reliably identifying the disorder.<sup>67</sup>

**Wender Utah Rating Scale.** This 25-question screening test<sup>68</sup> focuses on recollection of childhood symptoms of ADHD. In a study of people seeking outpatient treatment for cocaine dependence, it was more sensitive (missed fewer cases) than the ASRS-V1.1 Screener.

## **Treatment of Co-Occurring ADHD and SUDs**

Whether stimulant medications should be first-line therapy for people with co-occurring ADHD and SUDs is an active area of research. Many of the studies have focused on people who use cocaine; less is known about people with ADHD who use other substances.<sup>34</sup> Researchers have found that methylphenidate is effective at reducing ADHD symptoms in people with co-occurring ADHD and SUDs.<sup>34</sup> However, many studies in this area have been small and brief, and the findings have not been consistent. For example, in a randomized trial of sustained-release methylphenidate in people with co-occurring ADHD and cocaine dependence, participants who took the medication did not show a significantly greater reduction in ADHD symptoms than did participants who took a placebo.<sup>69</sup>

Another question is whether stimulant medications might have a positive effect on the SUDs of people with co-occurring ADHD and SUDs, particularly if some substance use stems from self-medication. The evidence from several studies is promising but inconclusive.<sup>34</sup>

The risk of stimulant medication abuse does not seem to be appreciably higher in people with co-occurring ADHD and SUDs than in those with ADHD alone, although the close monitoring and regular visits that are part of many studies may make their findings less applicable to people receiving care in the community.<sup>70</sup>

In a study of adults with alcohol use disorder who recently stopped drinking, the nonstimulant medication atomoxetine was shown to help with ADHD; the effects on drinking behavior were inconclusive.<sup>71</sup> However, in a study of 70 adolescents with ADHD and at least one non-nicotine SUD, the medication had no effect on ADHD symptoms or substance use.<sup>72</sup>

Currently, there are no guidelines for treating people with co-occurring ADHD and SUDs, partly because the research is limited and findings have been inconsistent.<sup>34</sup> Nor are there FDA-approved medications for addictions to stimulants. Therefore, treatment of addiction to prescription stimulant medication is based on behavioral therapy for treating cocaine and methamphetamine addictions.<sup>73</sup> Depending on the circumstance, the first step may be to taper the amount of the drug being used, and, after that, cognitive-behavioral or contingency management therapy might be effective.<sup>73</sup>

## **Prevention of Prescription Stimulant Abuse**

Prescribing extended-release formulations may prevent some stimulant medication abuse. They are believed to have less abuse potential than the immediate-release formulations because the

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medication enters the bloodstream more slowly, so the stimulating effects also occur more slowly.<sup>34</sup> In addition, it is difficult to extract the stimulant medication from the extended-release formulations for injection or intranasal administration.<sup>34</sup> Another approach is to avoid the stimulant medications altogether and prescribe a nonstimulant such as atomoxetine if appropriate.

Strategies proposed for reducing stimulant abuse on college campuses include programs to educate students about the possible harms of stimulant use.<sup>58</sup> Researchers have found that students who use diverted stimulant medication to cram for tests and write papers know little about the medications and believe they are harmless. Providing more academic support to students so they are less likely to resort to taking stimulants has been proposed, as has tighter control of prescription stimulants so people with ADHD do not have surplus pills to sell or give away.<sup>58</sup>

## Resources

### Adult ADHD Self-Report Scale-V1.1 (ASRS-V1.1) Screener

[www.hcp.med.harvard.edu/ncs/ftplib/adhd/6Q\\_ASRS\\_English.pdf](http://www.hcp.med.harvard.edu/ncs/ftplib/adhd/6Q_ASRS_English.pdf)

### Centers for Disease Control and Prevention

[www.cdc.gov/ncbddd/adhd](http://www.cdc.gov/ncbddd/adhd)

### National Institute of Mental Health

[www.nimh.nih.gov/health/publications/attention-deficit-hyperactivity-disorder/index.shtml](http://www.nimh.nih.gov/health/publications/attention-deficit-hyperactivity-disorder/index.shtml)

### National Resource Center on ADHD

[www.help4adhd.org](http://www.help4adhd.org)

### Wender Utah Rating Scale

[www.uvm.edu/medicine/ahec/documents/Wender\\_Utah\\_Rating\\_Scale.pdf](http://www.uvm.edu/medicine/ahec/documents/Wender_Utah_Rating_Scale.pdf)

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