



Addressing the unique issues of student athletes with ADHD

The impact of ADHD depends on an individual's symptoms and chosen sport, which, along with specific medication recommendations and cautions, help direct treatment choices.

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PRACTICE RECOMMENDATIONS

› Schedule twice-monthly visits when prescribing a psychostimulant to assess symptom control, review adverse effects, and record blood pressure, pulse, height, and weight in determining the optimal dose. **C**

› Keep in mind that using a psychostimulant can put endurance athletes at risk for heat-related injury. **C**

› Advise college-bound athletes that the NCAA requires a therapeutic use exemption for those who take psychostimulant medications. **C**

Strength of recommendation (SOR)

- A** Good-quality patient-oriented evidence
- B** Inconsistent or limited-quality patient-oriented evidence
- C** Consensus, usual practice, opinion, disease-oriented evidence, case series

The symptoms typical of attention-deficit/hyperactivity disorder (ADHD)—inability to focus concentration and maintain attention span, and associated hyperactivity—impair normal daily functioning and cause distress for affected individuals.¹ For the student athlete with ADHD, sports are a natural outlet, fulfilling the need to be active. In the case of a developing child with ADHD, involvement in sports often is a haven from negative feedback that can occur in the classroom and an environment in which to experience success.

Symptoms of ADHD also may offer an advantage in sports. Impulsivity, or the ability to act without reflection, enables quick decision-making and the spontaneity required of a quarterback or point guard.² Well-known athletes with ADHD have said that while tasks requiring long stretches of concentration are difficult, aspects of their sport involving instantaneous reactions help them to succeed. Evidence also shows a statistically significant decrease in markers of anxiety and depression among ADHD subjects with higher levels of sports participation.³

Given the positive experience sports can provide, children and adolescents with ADHD are likely to continue participating and be as large a segment of youth athletes as they are of the general population.^{2,4} Primary care providers often treat student athletes, and in this article we discuss the need for accurate diagnosis through comprehensive clinical evaluation, proper use of psychostimulant medication and other available treatments, and special health concerns for athletes who have ADHD.

Diagnosis: The need for awareness and accurate evaluation

The worldwide prevalence of ADHD is 5.3%.⁵ In the United States, it is 8.7% among adolescents and 4.4% among adults.^{6,7}

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TABLE 1

Differential diagnosis for inattention and hyperactivity^{1,3,4,6}

Psychiatric conditions	Systemic medical conditions	Environmental factors	Neurologic conditions
Major depression	Hyperthyroidism	Abuse or neglect	Hearing deficits
Generalized anxiety disorder	Lead or other toxicities	Disruptive environment	Petit mal and partial complex seizures
Obsessive-compulsive disorder	Hepatic disease	Giftedness or cultural factors	Post-concussion syndrome
Substance abuse	Sleep apnea		Learning disability
Conduct disorders			Tourette syndrome
Personality disorders			Pervasive developmental disorders (eg, autism)

One study of NFL athletes found that 14 of 159 players studied had either ADHD or a learning disability for a combined prevalence of 8.8%.⁸ ADHD is diagnosed 3 times more often in males than females⁹; however, studies have shown no gender effect on ADHD, and referral patterns contribute to the higher prevalence pattern for males.¹⁰

ADHD usually is diagnosed in childhood, but increasingly, it is not established until adolescence or adulthood.^{2,9} Although there is no age limit for the diagnosis, the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) calls for the presence of some symptoms before age 12, and symptoms must cause impairment of functioning in multiple settings.¹ While hyperactivity symptoms may decrease over time, a significant number of children and adolescents will experience inattention symptoms into adulthood.¹¹ In fact, the disorder may not become evident until college entry, when academic demands overwhelm an individual's usual coping strategies.²

Multiple reasons for an accurate diagnosis. Initiate evaluation for ADHD for any child 4 to 18 years of age who exhibits symptoms of inattention, hyperactivity, or impulsivity to such a degree that it causes distress or impairment at home, at school, or on the sports field.¹² Making an accurate diagnosis of ADHD is vital in student athletes given that treatment, or lack thereof, may put their health at risk and adversely impact their academic and athletic performances. Diagnostic accuracy also aids in distinguishing

the student athlete with a legitimate need for treatment from one who is fine and merely looking for a performance enhancer.⁹ Moreover, having a comprehensive assessment with diagnostic confirmation already in place when an individual enters college greatly facilitates completion of National Collegiate Athletic Association (NCAA) medical exemption documentation.

Essential diagnostic steps. The core clinical evaluation should cover the following:

- Ensure that DSM-5 criteria are met.
- Obtain objective reports to confirm the presence of symptoms in multiple settings. Commonly applied symptom assessment scales include the Brown, Vanderbilt, and Connors questionnaires administered to parents, teachers, and adolescent patients mature enough to complete a self-evaluation.
- Determine whether comorbid conditions are present.
- Rule out medical conditions that can mimic ADHD (eg, lead toxicity or thyroid disorder).

No neurocognitive or laboratory test for ADHD has sufficient sensitivity and specificity to qualify as a standard diagnostic test.^{2,13} In the future, advanced neuroimaging may provide a means of diagnosing ADHD. Functional magnetic resonance imaging has shown characteristic patterns of reduced activation in the basal ganglia, frontal lobe, and parietal lobes in patients with ADHD.¹⁴

■ **The differential diagnosis** for symptoms of inattention and hyperactivity is large (TABLE 1).^{1,3,4,6} Once underlying medical conditions have been ruled out, screen the patient for mental disorders, including depression and mood disorders, anxiety, and conduct disorders, before concluding that symptoms are likely due to ADHD. When compared with mood disorders, a patient with ADHD will have a persistent course of symptoms rather than periods of recurring and remitting symptoms.² ADHD is a chronic condition that raises special health care concerns for children and adolescents.¹² As many as two-thirds of children with ADHD have at least one coexisting neuropsychiatric condition, and symptoms may overlap, making for a significant diagnostic and management challenge.⁹ Difficult cases may necessitate consulting a specialist (psychiatrist, neurologist, or neuropsychologist) for guidance. Additionally, in ADHD youth the overall risk of developing a substance use disorder is twice that of children who do not have ADHD.^{2,15}

Treatment: More than medication

Effective treatment for ADHD improves quality of life, decreases the rate of substance abuse, reduces errors when driving vehicles, and decreases the prevalence of comorbid psychological disorders.^{16,17} Pharmacologic and nonpharmacologic options are available. With athletes, it's important to be aware of and consider alternatives to medication, particularly given the rules restricting the use of stimulant medication by the NCAA, International Olympic Committee (IOC), and the World Anti-Doping Agency (WADA). The IOC and WADA prohibit any use of stimulant medications, and the NCAA requires a therapeutic-use exemption (TUE) for athletes who take psychostimulant medications (detailed at right).^{3,16}

Nonpharmacologic treatment

Published guidelines on managing ADHD show greater agreement on pharmacologic treatment than on psychosocial interventions, based on strength of evidence.¹⁸ One evidence-based psychosocial intervention

that has shown benefit is behavior therapy, which includes a broad set of specific interventions that modify physical and social environments to change behavior.¹⁹ Behavioral training, which primary care providers can introduce to parents, teachers, and coaches, involves the simple principles of reinforcing desired behavior through reward and ignoring undesired behavior to reduce or eliminate it. Consistent application of rewards or unresponsiveness helps patients increase attention to instructions, comply with rules, improve productivity, and decrease disruptive behavior.²⁰

The athlete with ADHD will benefit from a structured environment and, depending on age and level of maturity, can be educated by coaches on self-management strategies such as time management, effective planning and organization, and avoidance of distractions.²⁰ Exercise may help relieve subjective symptoms of ADHD and comorbid mood disorders, but evidence is insufficient to determine its direct impact on ADHD.

Pharmacologic treatment

Of the many available medications used to treat ADHD (TABLE 2),^{9,12,16,18,20,21} psychostimulants are most effective for reducing core symptoms of the disorder.²² It is estimated that 56% of patients with ADHD receive drug therapy, and most of these drugs are psychostimulants.¹⁶ These agents increase dopamine and norepinephrine concentrations in the brainstem, midbrain, and frontal cortex, which likely is responsible for increasing attention span and concentration.²³ As judged by increased attention or decreased hyperactivity in a recent cohort-based study, the positive response rate to psychostimulants was 73.1%.²⁴

Atomoxetine, a selective norepinephrine reuptake inhibitor, is the primary US Food and Drug Administration (FDA)-approved nonstimulant medication for the treatment of ADHD. In double-blind randomized trials, atomoxetine was roughly equivalent to psychostimulants in reducing target symptoms.^{21,25} Typically more expensive than psychostimulants, atomoxetine is an acceptable alternative and the more appropriate agent for the ADHD patient with a history of illicit



Accurate diagnosis is needed to distinguish a legitimate need for treatment from an unwarranted request for a stimulant.

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Atomoxetine carries a black-box warning regarding suicidality in children and adolescents during the first month of treatment.

substance abuse or the athlete whose sport bans the use of stimulant medications.

■ **Medication adverse effects.** Adverse effects common to psychostimulants are generally mild and include decreased appetite and sleep disturbances. Less common are nervousness, irritability, headache, and increased heart rate and blood pressure (BP).²² Overdose can result in drug-induced psychosis or cardiac arrest.²⁶ Most of these effects are reversible or preventable through dose reduction, increasing the dosing interval, or changing time of dosing during the day. Linear growth rate deceleration in both height and weight may occur in children and adolescents, but this effect is thought to be small and reversible upon discontinuation of medication.^{27,28}

Contraindications to using psychostimulant medications include symptomatic cardiovascular disease, structural heart disease, uncontrolled hypertension, hyperthyroidism, glaucoma, stimulant hypersensitivity, psychosis, and a history of drug dependence.²⁹ Psychostimulants are Schedule II drugs, which means they pose a high potential for abuse and risk for development of physical dependence. The nonstimulant medications listed in **TABLE 2** are not Schedule II drugs and, though not as efficacious, generally are safer and lack the adverse effects typically seen with psychostimulants. Atomoxetine, however, carries a black-box warning regarding the risk of suicidality in children and adolescents during the first month of treatment, and patients should be counseled accordingly. Long-term effects of ADHD medications, either adverse or positive, remain unknown; few studies have been done over a period longer than 24 months.²⁵

Medication management

Psychostimulant therapy for ADHD has 3 essential stages: initiation/titration, maintenance, and termination.

■ **With initiation and titration,** determining the optimal dose requires twice monthly follow-up visits. With each visit, assess symptom control, review adverse effects, and record BP, pulse, height, and weight. The optimal dose is one at which target outcomes are achieved with minimal adverse effects. Long-acting agents are preferred to enhance

compliance, ensure dosing consistency, and reduce abuse potential. If the desired outcome is not being achieved at the highest feasible dose, an alternative psychostimulant may be tried. If a desired response is still not achieved, reevaluate the diagnosis or consider the possibility of comorbid conditions or that the patient has stopped taking the medication.

■ **During the maintenance stage,** it is prudent to have monthly contact with the student athlete before writing refill prescription for a Schedule II medication.

■ **Determining when to terminate treatment** is a highly individualized decision that entails ongoing analysis of risks vs benefit.^{9,12,16,26,29} A student athlete's diagnosis of ADHD might have been based on a positive response to medication in lieu of a comprehensive evaluation, which is regrettable. Response to medication cannot be used to confirm or refute a diagnosis of ADHD because psychostimulant medication will improve behavior in conditions other than ADHD, including learning disability and depression.²²

■ **Misuse of psychostimulants among athletes.** Some athletes will use a psychostimulant primarily as an appetite suppressant for weight control. However, perceived ergogenic effects are what make psychostimulants especially problematic,¹⁶ and are the main reason they are banned from competitive sports. Potential performance enhancements include improved concentration and attention to tasks, increased aggression, decreased pain perception, and euphoria.

A 2006 NCAA study of substance abuse habits of college student athletes (reflecting 2005-2006 data) demonstrated the following findings concerning ergogenic use of psychostimulants:³⁰

- Psychostimulant use has continually increased since 1997 among all student athletes.
- Psychostimulant use has increased across all divisions, with highest use in Division III.
- Psychostimulant use increased in all men's sports except basketball, football, and swimming.
- Psychostimulant use increased in all women's sports except tennis, gymnastics, soccer, and volleyball.

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TABLE 2

Medications prescribed for ADHD^{9,12,16,18,20,21}

Medication groups and agents	Brand names	Duration of action	Comments
Psychostimulants			
Methylphenidate	Short-acting Ritalin/Methylin	3-5 h	Adverse effects include decreased appetite, sleep disturbances, nervousness, irritability, headache, and increased blood pressure and heart rate. Contraindications include symptomatic or structural heart disease, uncontrolled hypertension, hyperthyroidism, glaucoma, stimulant hypersensitivity, psychosis, and history of drug dependence.
	Intermediate-acting Ritalin SR/Metadate ER/Methylin ER Focalin (dexmethylphenidate)	4-8 h 5-6 h	
	Long-acting Concerta/Ritalin LA/Metadate CD Focalin XR (dexmethylphenidate)	8-10 h 10-12 h	
	Daytrana Patch	Up to 12 h	
Dextroamphetamine and amphetamine (“amphetamine salts”)	Intermediate-acting Adderall	6-8 h	See above.
	Long-acting Adderall XR	8-10 h	
Dextroamphetamine	Short-acting Dexedrine/Dextrostat	4-6 h	See above.
	Intermediate-acting Dexedrine Spansule	6-8 h	
Lisdexamfetamine	Vyvanse	8-12 h	See above.
Modafinil	Provigil	10-12 h	Classified as “wakefulness promoter/cognitive enhancer.” Indicated for fatigue due to sleep apnea/MS, narcolepsy. <i>Not approved for pediatric patients due to risk of Stevens-Johnson syndrome.</i>
Armodafinil	Nuvigil	12-15 h	
Nonstimulants			
Atomoxetine	Strattera	Up to 24 h	Selective norepinephrine reuptake inhibitor. <i>Contains black-box warning.</i> (See text.)
Antidepressants Bupropion	Wellbutrin		Dopamine and norepinephrine reuptake inhibitor. Typically used as adjunct ADHD treatment. Improves attention dysfunction.
Imipramine Nortriptyline Amitriptyline Desipramine	Tofranil Pamelor Elavil/Endep Norpramin		Due to side effect profile, not usually recommended for competitive athletes.
Alpha-2 adrenergic agonists Clonidine Guanfacine	Catapres/Kapvay Intuniv/Tenex		Rarely used. FDA-approved for patients 6-17 years of age.

ADHD, attention-deficit/hyperactivity disorder; FDA, US Food and Drug Administration; MS, multiple sclerosis.



There is no compelling evidence to show that children with ADHD treated with psychostimulants are at higher risk of sudden cardiac death.

- Respondents who used stimulants said they did so to get more energy or to treat ADHD.
- Respondents who didn't use stimulants said they were concerned about the effect on health, side effects, and going against personal beliefs.³⁰ (The latter issue regarding why student athletes do or do not use specific substances is a focus of the 2012-2013 NCAA National Study of Substance Use Habits of College Student-Athletes, currently underway.)

■ **The rise in the nonprescription use of Adderall among National Football League (NFL) players** has become a hot topic. Regarded by the league as a game-day performance enhancer, it has been banned since 2006. Muddying the waters on the true prevalence of Adderall use is the NFL's policy of silence on identifying the specific performance-enhancing drug that triggered suspension. Only the player, if he so chooses, can disclose the substance in question. It has become convenient for players to name Adderall as the culprit, as it lacks the stigma attached to anabolic steroids and human growth hormone. Whether the drug is being used for ergogenic purposes or as an easy alibi, or both, remains unclear.³¹

Competition restrictions and therapeutic-use exemption

At the college level and beyond, psychostimulant use is highly regulated in competitive sports. Primary care providers can be supportive by being mindful of existing restrictions when making treatment decisions, and by keeping detailed documentation as stipulated in NCAA policy that became effective on August 1, 2009.³⁰

The policy requires student athletes with ADHD who take psychostimulant medication to provide "evidence that the student athlete has undergone clinical assessment to diagnose the disorder, is being monitored routinely with use of psychostimulant medication and has a current prescription on file." If the diagnosis of ADHD was made in childhood, policy requires the student athlete to

provide their institution with a copy of the comprehensive assessment, including history of treatment. If such documents are not available, then a comprehensive assessment, must be performed to establish the diagnosis.

At minimum, documentation must include a description of the evaluation process and assessment tool(s) used; a statement of the diagnosis; a history of ADHD treatment, both previous and ongoing; a statement that a nonbanned alternative ADHD medication has been considered, if a psychostimulant is currently prescribed; and a statement reflecting evidence of ongoing follow-up/medication monitoring.

If a psychostimulant medication is prescribed, NCAA regulations require that a TUE be included in the documentation. The NCAA asks only that the prescribing physician consider nonstimulants first; they do not require an initial trial of a nonstimulant medication.^{2,9,16} Per NCAA regulation the student athlete must undergo, at minimum, an annual clinical evaluation by the team physician. The NCAA Committee on Safeguards and Medical Aspects of Sports has issued a new mandatory reporting form that contains criteria, including any known history of substance abuse, to help differentiate legitimate use worthy of medical exemption from use that is abusive.³²

The student athlete participating in events sanctioned by WADA or IOC must be aware that use of psychostimulant medication is prohibited in competition. The only FDA-approved ADHD medication allowed for use in competition by all governing bodies is atomoxetine. Encourage student athletes to check governing organization Web sites to review current restrictions on use of psychostimulants in competition. Psychostimulants are banned in all professional sports, though many allow a TUE (except the National Hockey League). The process of obtaining a TUE is rigorous, and Major League Baseball requires a second opinion.^{2,9,16,33}

Specific health concerns for student athletes treated for ADHD

Sudden cardiac death (SCD) is rare among athletes and most often associated with con-

genital abnormalities affecting heart structure and electrical conduction.¹⁶ Although there have been reports of cardiac arrhythmias related to the use of psychostimulants, no compelling clinical evidence has demonstrated a higher incidence of SCD in pediatric ADHD patients treated with psychostimulants compared with the general population.³⁴

The American Academy of Pediatrics, in a policy statement subsequently endorsed by the American Medical Society for Sports Medicine, does not support the routine use of electrocardiograms before initiating psychostimulant therapy.^{16,34}

In light of the cardiovascular side effects of psychostimulants, it remains prudent to obtain a thorough cardiovascular history before starting medication. If no preexisting cardiac disease is identified, psychostimulants can be safely prescribed for the ADHD athlete without worry about the risk of SCD.³⁴

Psychostimulants can confer risk of heat injury

Endurance ADHD athletes on psychostimulants may be at increased risk of heat injury when exercising in warm conditions. Evidence suggests that psychostimulants can increase core temperature while also masking signs and symptoms of fatigue, allowing for a longer duration of exercise and delayed time to exhaustion in the presence of elevated core temperature and heart rate.³⁵

In one placebo-controlled trial of exercise under warm conditions, core temperature measurements in athletes taking 20 mg of methylphenidate often exceeded 104°F, and the athletes experienced no change in their perception of effort or thermal stress.³⁶ These factors raise concerns for increased risk of heat-related injury in the ADHD athlete taking psychostimulant medication. Close monitoring is required.

Your role as the primary care provider

An optimal treatment plan for the ADHD athlete, especially one using a psychostimulant medication, should always be individualized. Many factors come into play: the nature of

Anticipating and addressing the misuse of psychostimulants

Psychostimulant medication, with its direct actions and adverse effects, has great potential for misuse, and the past 10 years have seen a surge in nonprescription stimulant use among adolescents and young adults.²⁶ The reason most commonly given for using a stimulant is to enhance academic performance through improved alertness and sharpened focus.

Adderall is the psychostimulant most in demand as a “study drug.” Among college students, evidence suggests the individual most likely to misuse Adderall is white, male, affiliated with a formal fraternity, and more likely to use other illicit substances.²⁶ Adding to the perpetuation of this phenomenon is that it is relatively stigma-free: Public opinion does not consistently condemn the use of Adderall for academic means, effectively legitimizing nonprescription use.

Very few universities have an academic policy associating nonprescription use of psychostimulants with cheating. The result is an unprecedented demand for psychostimulant medications,³⁷ which are increasingly obtained through diversion by profiteering peers or from clinicians under false pretenses.²⁶

To help curb the problem of misuse, consider stigmatizing such behavior and stress that, in addition to significant health risks associated with inappropriate use, the vast majority of evidence shows no cognitive enhancement with stimulants when compared with placebo in healthy individuals. Given that psychostimulant misuse is more common with an immediate-release formulation, one means of prevention is to restrict legitimate prescriptions to long-acting formulation as much as possible.³⁸⁻⁴⁰

impairing symptoms, presence of comorbidities, and prior response to medication.

How the psychostimulant is taken also can vary depending on an athlete's preference and the nature of the sport. For example, some athletes will take the medication only for academic purposes (studying, testing). Other athletes feel their sport performance improves while on psychostimulants (eg, a baseball catcher who requires game-long concentration), while yet others prefer not to take it during an event so they can remain unfocused, move randomly, and maintain spontaneity (as with a basketball point guard).

If psychostimulants are to be used while playing, it is wise not to initiate therapy during a high-stress event, such as a championship game. In addition, it is important to know when to withhold medication, as in the

case of an endurance athlete competing in hot weather.

Coordinating all aspects of care

In providing the best care for the ADHD athlete, the primary care physician must possess comprehensive knowledge of evidence-based best practices. Educate yourself about all available therapies, including behavioral management and use of psychostimulants. And become familiar with available resources and with the referral network (eg, neuropsychologist).

Acknowledgement of NCAA regulations/restrictions is vital to making treatment decisions. In light of the many regulations (both governmental and within the competitive sporting world), consider the use of nonbanned medications and behavioral therapies whenever possible. Throughout the treatment process, involve all stakeholders—parents, athletic trainers, coaches, teach-

ers—to sustain a collaborative approach to care.

Be attentive to signs of inappropriate use of psychostimulant medication (See “Anticipating and addressing the misuse of psychostimulants” on page E7^{26,37-40}). However, fear of potential misuse is not justification for withholding medication, especially when a clear indication is evident. Failure to recognize ADHD as a legitimate problem puts both academic and social hurdles in the path of the student athlete. Evidence shows that adequately treating ADHD with indicated pharmacotherapy actually reduces subsequent substance abuse.⁴¹ Finally, education of every ADHD athlete on existing restrictions/regulations/requirements as posed by governing bodies (NCAA, US Anti-Doping Agency, WADA, and IOC) is imperative. **JFP**

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Do not withhold medication for fear of potential misuse, but be attentive to signs of inappropriate use.

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