

Considerations in the Use of Stimulants in Sport

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Abstract Medication treatment of adult athletes with attention-deficit/hyperactivity disorder (ADHD) is controversial. Some articles and guidelines support the use of stimulant medications in this population, while others advise against it. We believe that the important issues regarding the use of stimulant medications in athletes include the likelihood of performance enhancement, poor inter-rater reliability of ADHD diagnosis in relation to therapeutic use, policies of sport-governing bodies, psychiatric treatment of mental illness, and dangerous consequences of use. We review the literature on these five issues and conclude by discussing the ethical principle of fairness, and suggest some proposals regarding the use of stimulants by athletes that balance these five issues and fairness. Our ultimate recommendation is that stimulants should not be used by high-level adult athletes.

Key Points

Important issues to consider when contemplating whether athletes should be prescribed stimulant medications include the likelihood of performance enhancement, poor inter-rater reliability of attention-deficit/hyperactivity disorder (ADHD) diagnosis in relation to therapeutic use, policies of sport-governing bodies, psychiatric treatment of mental illness, and dangerous consequences of use.

Options other than stimulant medications should be seriously considered before prescribing this class of medications to high-level adult athletes.

Based on clinical and ethical considerations, we believe that sport-governing bodies should prohibit the use of stimulant medications at the elite or professional level, without allowing therapeutic use exemptions for their use.

1 Background

Medication treatment of athletes, especially adults, with attention-deficit/hyperactivity disorder (ADHD) is controversial [1–4]. While some recent articles and guidelines support the use of stimulant medications in athletes, others advise against the use of non-stimulant treatments [5]. The number of athletes, especially at top levels of competition, reported to be using stimulant medications has markedly increased in recent years. In the USA, the National

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Collegiate Athletic Association (NCAA) acknowledged that the number of student athletes testing positive for stimulant medications has increased threefold in recent years. As a result, they have instituted stricter application of their medical exception policy for the use of banned stimulant medications to treat ADHD [6]. There has also been concern about inappropriate use of stimulants in major league baseball (MLB) in the USA. According to a report released in January 2009, a total of 106 players, representing 8 % of MLB players, obtained therapeutic use exemptions (TUEs) for ADHD drugs in 2008, which was a large increase from 28 players in 2006 [7].

We believe the important issues regarding the use of stimulant medications in athletes are as follows: (1) likelihood of performance enhancement, (2) poor inter-rater reliability of ADHD diagnosis in relation to therapeutic use, (3) policies of sport-governing bodies; (4) psychiatric treatment of mental illness; and (5) dangerous consequences of use. In this paper, we provide background literature on these issues. We then discuss the ethical principle of fairness, and suggest proposals regarding the use of stimulants by athletes that balance these five issues and fairness.

2 Literature Search Methodology

We conducted a MEDLINE search to identify studies related to the above five areas. Search terms included the following, individually and in combination: psychiatry, athletes, sports, sport psychiatry, mental illness, attention-deficit/hyperactivity disorder, ADHD, stimulants, psychotropics, medications, psychiatric medications, safety, cardiac, heat illness, performance enhancement, regulations, ethics, National Collegiate Athletic Association, World Anti-Doping Agency, International Olympic Committee, and governing bodies. We restricted results to the English language and used no date restrictions. We retrieved all papers discussing ADHD in athletes. We reviewed the findings of each article, and surveyed the references of each paper for additional papers missed in the initial search.

3 Findings

3.1 Likelihood of Performance Enhancement

In 1957, two Olympic athletes admitted to using amphetamine to enhance performance, thereby leading the American Medical Association to create an ad hoc committee to study the use of amphetamine in sport. This led to the first report of stimulants as performance enhancing in

1959. The study showed that a single dose of amphetamine 14 mg enhanced performance in swimmers, runners, and weight throwers [8]. Many subsequent studies have improved on this initial study's methodology, for example, by using adequate controls [9]. One such study showed that one dose of dextroamphetamine, compared with placebo, resulted in increased strength, acceleration, anaerobic capacity, time to exhaustion, and maximum heart rates [10].

Besides any impact on speed, strength, and endurance, stimulants may have physical effects that are uniquely beneficial in certain sports. For example, stimulants may improve fine motor coordination in some sports [11]. Athletes competing in sports for which aesthetics are deemed important, such as gymnastics, or in sports with specific weight classes, such as wrestling, may seek stimulant prescriptions for a weight loss advantage [12].

3.2 Inter-Rater Reliability of Attention-Deficit/Hyperactivity Disorder (ADHD) Diagnosis

There is no objective physiologic measurement of ADHD, and as such, its diagnosis is made using history and clinical examination. ADHD diagnosis is not applied uniformly, which may result in athletes who do not actually have ADHD being treated with stimulants. Non-uniform approaches to ADHD diagnosis may be particularly common in athletes. Relative hyperactivity of athletes may be mistaken as a disorder, when in fact that hyperactivity can be adaptive for athletes and not cause dysfunction [9]. Recent articles attest to non-traditional approaches to ADHD diagnosis in athletes. One such article states that ADHD may first manifest in college [2]. Additionally, the recent World Anti-Doping Agency (WADA) document on ADHD suggests that the condition may first appear at a young adult age [13]. However, that is not in keeping with research that shows that ADHD is a brain developmental disorder that arises by the age of 12 years and with the criteria set forth in the Diagnostic and Statistical Manual of Mental Disorders (DSM), fifth edition [14]. Finally, Parr [2] reported that ADHD may be more common in college sportsmen and sportswomen than in the general population, but we found no evidence in the literature to support this claim.

3.3 Policies of Sport-Governing Bodies

Various sport-governing bodies oversee higher-level sports competitions. For example, the NCAA oversees US college sports, and the WADA oversees world-wide sports, usually at elite and professional levels of competition.

Confusion exists surrounding rules and recommendations of national and international sport-governing bodies

regarding stimulant use by athletes. Rules in sport frequently change over time, and that is also true here. At present, the NCAA allows athletes to use stimulants if they report the banned medication to their institution upon matriculation or when treatment commences. Then, documentation of the student's ADHD evaluation, statement of the diagnosis, history of ADHD treatment, and copy of the most recent prescription must be submitted by the institution in the event the student tests positive for the banned substance [6]. However, even if a college student takes stimulants but does not follow the above NCAA guidelines and subsequently tests positive for the substance, there may be no negative consequences. The NCAA website states that even if the athlete in this scenario then undergoes evaluation after the fact that determines him or her not to have ADHD, "The outcome of that process may be not to penalize the student-athlete, but require the student-athlete to discontinue using the banned medication" [6]. Given that NCAA drug testing is relatively infrequent, especially for non-Division I NCAA schools, college student athletes in the USA apparently have little to risk in taking stimulants without going through all of the recommended paperwork. Additionally, the student athlete's NCAA institution is allowed to pay for the medical evaluation that is conducted to document the diagnosis and treatment of ADHD [6]. If the NCAA institution or the athlete were to pay for the evaluation, a physician who is specifically asked to document the presence of ADHD may have a conflict of interest that could bias the outcome. Indeed, in this situation there may be no 'independent evaluator,' as the college or athlete requesting the evaluation could continue to 'shop around' until a favorable evaluation is found.

WADA allows TUEs to permit athletes to take stimulants if deemed necessary by their physicians. Elite athletes who compete on the international scene and whose physicians feel they should continue stimulant use must obtain a TUE from WADA, other international sports federation, or the International Olympic Committee. Physicians involved in provision of these TUEs to elite athletes may have problematic conflicts of interest similar to those providing ADHD diagnoses and documentation to NCAA athletes.

Confusion surrounding the WADA regulations have appeared in the medical literature. An article containing the position statement of the American Medical Society for Sports Medicine incorrectly stated "In contrast to the NCAA regulations, athletes who are also participating in events governed by the IOC [International Olympic Committee] and/or WADA are not allowed to use stimulant medications, even with a Therapeutic Use Exemption. These organizations require that the athlete with ADHD on stimulant medications stop taking these medications or risk disqualification." In reality, the WADA website explicitly

states, "There is no requirement to cease treatment during competition period" [13]. Subsequently, the journal issued a correction to the error, though the error in the first place attests to confusion even among those most expert in this field [3].

Finally, the NCAA and WADA, as governing bodies, have conflicting recommendations regarding trials of stimulants versus non-stimulants for ADHD in athletes. The NCAA does not require prescribers to try a non-stimulant medication before prescribing a stimulant, though it does ask the prescriber to "consider" non-stimulants first [6]. As a result of this rather vague statement, it is unlikely that prescribers apply this recommendation uniformly. In contrast, the authors of the WADA statement imply that stimulants should be used first-line without non-stimulant trials [13]. They state that atomoxetine, one of the non-stimulant medications that the US FDA has approved to treat ADHD, should not be tried first because it apparently is less effective and has different side effects than stimulants. It is true that atomoxetine takes longer to take effect than stimulants, and thus it may not be as easy to prescribe and titrate as the stimulants. The WADA authors particularly mention the side effects of somnolence, sexual dysfunction, and occasionally liver complications with atomoxetine. However, placebo-controlled trials show that all of these side effects are relatively rare in adults [15]. Moreover, some side effects, e.g., insomnia, may be *less* problematic with atomoxetine than with stimulants [16]. A recent review demonstrated that both stimulant and non-stimulant medications to treat ADHD in adults are well-tolerated [1]. Additionally, other reports by sports psychiatrists do advocate for a trial of atomoxetine for athletes [12]. While other selective norepinephrine reuptake inhibitors have not been found to be performance enhancing [17], atomoxetine itself has not been studied in terms of its potential to enhance performance.

3.4 Psychiatric Treatment of Mental Illness

Psychiatric issues to consider in treating sports participants with ADHD include not only the types of medications that should be used (see Sect. 3.3) but also the dosing strategies for those medications, whether or not medications are necessary in the first place, and the presence of comorbid psychiatric conditions.

When prescribing stimulants for athletes, physicians take different approaches as to whether stimulants should be used during the time of practice or competition or whether they should be stopped during those times and only used during school or work hours. If stimulants were not used during practice and competition, it would remove some of the ethical and medical concerns associated with their use. It is also not clear whether ADHD symptoms

would cause dysfunction of any sort at those times for any given athlete. Some people with ADHD are known to have particular difficulty with activities that they find boring or non-engaging but do well in activities that they find interesting or positively reinforcing [12]. Moreover, authors have suggested that some ADHD symptoms themselves may be adaptive for sport performance. For example, Conant-Norville and Tofler [12] wrote, “Basketball point guards almost universally find that their performance falters when on medication. They complain of lack of spontaneity and too much predictability in their play.” Nonetheless, others have hypothesized that untreated ADHD symptoms might be problematic in sport, for example, by promoting impulsive behavior and making it more difficult to follow coaches’ instructions. Indeed, for some sports, athletic activity may involve cognitive tasks that would benefit from medication.

Recent research supports the hypothesis that exercise itself can help treat symptoms of ADHD [18, 19], which would further support the idea that stimulant use during sport may be unnecessary, and that the risks may be more likely to outweigh the benefits, particularly during that time. Recent review articles on that same topic supported the idea that exercise can help decrease ADHD symptoms [20, 21].

ADHD is commonly comorbid with other psychiatric conditions, including oppositional defiant disorder and conduct disorder in children, anxiety, depression, and substance abuse. Thus, some feel that if sports participants are not treated for ADHD, they may be at greater risk of developing these other conditions, especially substance abuse. However, the literature on this is mixed [22]. Even if this scenario were to play out in untreated ADHD of childhood, there is no clear evidence that ADHD in adults untreated with stimulants would result in a similar sequence of events.

3.5 Dangerous Consequences of Use

Stimulants may be physically dangerous when used by athletes who are pushing their bodies to extremes. Heat illness and cardiac dysfunction are two concerns. Methylphenidate may allow athletes to exercise to a higher core body temperature and heart rate without perceiving greater effort or thermal stress [23]. In its position statement, the European Society of Cardiology Study Group of Sports Cardiology summarized the literature, stating that stimulant intoxication or long-term exposure can result in stroke, hypertension, tachycardia or bradycardia, cardiac rhythm disturbances, coronary events, coma, and death [24]. While a scientific statement by the American Heart Association suggests that stimulants may only pose a major cardiac risk if there is a pre-existing cardiac defect, this statement is

directed at children and adolescents, and not athletes in general, including elite-level adult athletes exercising at extreme intensities [25].

Rates of abuse of stimulants provided to patients by physicians are high [26]. Thus, even if stimulants at usual prescribed dosages did not cause cardiac sequelae, some athletes who receive those prescriptions will abuse them, thereby putting themselves at higher risk for medical sequelae than non-athlete stimulant abusers who do not exercise to such great intensity. Additionally, rates of use of stimulants by NCAA college athletes without prescriptions from physicians, which could be a sign of abuse, are not negligible. The most recent NCAA drug-use survey indicated that 6.3 % of student athletes reported using stimulants without a physician’s prescription [27].

4 Discussion

4.1 Ethical Issues in the Use of Performance-Enhancing Drugs by Participants in Sport

Any performance enhancement that a participant in sport may receive from taking a drug raises an important ethical concern. An essential value in sport is fair competition. The concept of a ‘level playing field’ involves the principle that athletes should play by the same set of rules, and that each side in a competition should perform without external influences that affect its ability and that are not tilted in favor of any participant. Sport also involves the values of participation and inclusion. Some athletes will have health conditions that are treated with drugs, and some of these drugs may affect their performance. This presents an ethical conflict between the values of fair competition and participation.

The intensity and importance of competition in sport varies with age and ability. This is easy to see at the extremes. For young children or beginners of any age, participation is more important than competition. Learning the skills of the sport, playing with others, and enjoying the activity typically outweigh the importance of winning. For players at the elite level, there is little question that the effort to succeed is primary.

Participants between these extremes lie in a grey area. There is tension between the values of participation and competition. For school-age athletes, most people would place a strong value on participation. These young people are students whose primary job is to perform as well as they can in school and to develop life skills. Athletic participation is one element of this larger goal. Many school-based athletic programs explicitly proclaim the value of inclusion, in which all students who wish to do so may participate. If a student has a medical condition that can be

treated using a drug that may also enhance athletic performance, the benefit of maximizing the health of the student—including the ability of the student to do well in school and to learn life skills—is more important in the long run than the cost that this person may gain an unfair advantage in athletic competition.

Competitive advantage may be relatively unimportant in the long-run for most school-age athletes (though they may not perceive it to be so at the time) because, for most, their livelihoods and careers do not depend upon performance in sport. However, at higher levels of competition, a performance advantage of even one one-hundredth of a second can make a significant difference in fame, opportunities, and financial remuneration. Applying this argument to sports participants at the elite level, no use of performance enhancing substances is fair, and therefore all use should be prohibited.

Some will argue that there are many performance-enhancing strategies, including the use of caffeine, augmented nutrition, and altitude training, all of which are ‘legal’ but only often available to high-level athletes who are well-supported financially. Nonetheless, we do not believe these strategies bring with them the same concerns, for example, surrounding inter-rater reliability and potential medical consequences.

Some have advocated that because it is difficult to police the use of performance-enhancing substances, and because those who use them will frequently be at least one step ahead of those who attempt to identify the users, there should be no prohibition whatsoever on the use of performance-enhancing substances. This position has a pragmatic appeal. However, it would create a culture that is more than merely unfair. At the elite level and even at levels below that, we believe that in the absence of prohibition, many participants would use performance-enhancing substances. Other participants would then be forced to choose to use substances to perform on the same ‘level playing field’ or not to use in order to protect their health and compete ‘naturally’. Certainly in sports training, participants make a variety of choices concerning what and what not to do. However, to add to this the need to use substances that may not be medically indicated and that may be harmful in order to compete on the same playing field seems to be an unnecessary burden. It may also encourage those who prescribe the medication to compromise their ethics.

4.2 Psychiatric and Other Medical Considerations Regarding the Use of Stimulants

Among sport participants requesting stimulants for their ADHD, some do not realize that if they take stimulants, they may put themselves at an unfair competitive advantage and expose themselves to some health risk. If so

informed, some may be grateful, and the information may influence their decision to take stimulants. In our experience, participants may prefer this to learning about the issues after the fact, when they could be left wondering if they really would have performed as well had they not been taking a potentially ergogenic medication.

An additional issue surrounds how the diagnosis of ADHD is applied to athletes. In Sect. 3.2, we report evidence that ADHD may not always be diagnosed in a manner consistent with the DSM. As a result, stimulants are used by some who may not have the diagnosis but rather to enhance performance, with the attendant ethical and medical concerns we have discussed.

Finally, we have reviewed the primary medical concerns that exist in using stimulants in athletes. Heat illness and cardiac concerns may be of greater concern in athletes than non-athletes using stimulants because athletes physically push their bodies to extremes. Furthermore, athletes may be particularly tempted to use stimulants in amounts greater than prescribed because of their performance-enhancing effects.

4.3 Policy Considerations Regarding the Use of Stimulants

We have described the inconsistencies in NCAA and WADA guidelines, and in references to these guidelines in the medical literature. This likely reflects a lack of consensus on ‘what is right’ and disagreements about the ethical issues with regards to the use of stimulants in sport. Physicians and athletes would benefit greatly from receiving a consistent message. It would be helpful to specify different rules for different levels of competition, following on from the discussion about achieving a balance between ‘the level playing field’ and ‘participation and inclusion.’

Psychiatric issues primarily involve decisions about when and how ADHD should be treated with stimulants to optimize psychiatric outcomes. At the grade school, high school, and college level, few would disagree that academic performance should be the number one priority. Thus, in a student athlete with true ADHD, the ADHD may need to be treated with medication to optimize academic functioning (though the question remains as to whether the medication need be taken during practice and especially during competition, and if the medication need be a stimulant as opposed to, for example, atomoxetine).

However, once an athlete is at an elite or professional level after completing study, it makes less sense to treat ADHD with stimulants given the concerns above. That is not to say that stimulants may not possibly improve other important areas of functioning beyond academics, i.e., social and occupational functioning, but even that has not

Table 1 Recommendations for physicians and athletes regarding treatment of attention-deficit/hyperactivity disorder

Use behavioral interventions in all cases and at all levels of competition, as these may be as effective as stimulants in cases of ADHD with mild functional impairment [28]

In all levels of student athletes, when medication management may be necessary, this should start with trials of non-stimulant medications, e.g., atomoxetine. If an athlete has co-morbid depression, then bupropion may be a better first-line choice, as it can treat symptoms of both ADHD and depression. There is no significant evidence that either atomoxetine or bupropion is performance enhancing [29]. However, bupropion is on WADA's Monitoring List, meaning WADA is monitoring for any concerning trends of inappropriate use [30]. Thus, the recommendation to consider bupropion would change if in the future bupropion were found to be performance enhancing

If non-stimulant medications fail in student athletes, then stimulant medications could be tried. However, formulations and dosing regimens that allow for use of the medications during school/study times but not during practice and especially not during competition should be utilized when possible. The regulations of the NCAA should be strictly enforced for college students, and we would suggest adding to those regulations that a non-stimulant option must have failed before a stimulant can be tried. Given that national levels of competition are stepping stones to elite and professional sport, we recommend as an ultimate goal that collegiate sport-governing bodies consider prohibiting stimulants altogether in competition at national events

We would encourage WADA and other relevant sport-governing bodies to prohibit the use of stimulant medications at the elite or professional level, without the allowance for therapeutic use exemptions for this purpose

ADHD attention-deficit/hyperactivity disorder, NCAA National Collegiate Athletic Association, WADA World Anti-Doping Agency

been proven by research among adults with ADHD [1]. Even if research ultimately were to show that stimulants improved functioning in adults in non-academic arenas, elite-level athletes may need to choose between treating their ADHD with stimulants and competing at the elite level. Finally, if both the NCAA (or other collegiate regulatory bodies) and WADA mandated a trial of at least one non-stimulant medication such as atomoxetine prior to stimulants, this would harmonize their messages, and would very likely result in identifying more participants who respond to a safer and more fair medication option.

4.4 Recommendations

Taking all of the above into account, we propose a set of recommendations for physicians and athletes regarding the treatment of ADHD (Table 1).

These recommendations will not be without controversy. Some may argue that denial of stimulant medications to athletes is unfair to the individual athlete and further stigmatizes his or her mental illness in suggesting that optimal treatment is not really 'necessary.' However, that argument does not consider all of the issues that we have highlighted, especially that of the fairness of the 'level playing field' and the unfairness of performance enhancement through medication at higher levels of competition. We feel that these recommendations take a reasonable approach to balancing fairness, safety, and individual well-being for athletes with ADHD.

5 Conclusions

Medication treatment of athletes with ADHD is controversial. Toward the ultimate end of balancing fairness with inclusion in sport, stimulants may be a reasonable option

for school-age athletes with ADHD, while they make less sense at the elite or professional level.

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