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Prevalence of Self-Reported ADHD Symptoms Among Collegiate Athletes

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Prevalence of Self-Reported ADHD Symptoms Among Collegiate Athletes

Abstract

Purpose: Attention deficit hyperactivity disorder (ADHD) is a neuropsychiatric disorder that impacts an individual's ability to maintain attention span and focus their concentration at a normal level. While ADHD is one of the most well studied behavioral disorders, multiple researchers have stated the need for further research on the effects of ADHD on participation in sports. Therefore, the purpose of this study was to describe the prevalence of self-reported ADHD symptoms among collegiate student-athletes at an NCAA institution. A secondary purpose was to determine differences in self-reported ADHD symptoms based on demographic information and history of concussion. **Methods:** Subjects were selected for this study by retrospective review of pre-participation medical paperwork of the student-athletes of an NCAA Division II institution (n=418). A total of 110 student-athletes opened and completed the voluntary survey as part of pre-participation medical paperwork (access and response rate = 26.3%). Subjects were sent an electronic survey via email that collected demographic information and asked them to rate self-reported symptoms of ADHD using the Adult ADHD Self-Report Scale (ASRS). **Results:** Individuals who reported having been previously diagnosed with Attention Deficit Disorder (ADD) or ADHD reported significantly higher scores on the first six questions of the ASRS than those who had not (ADD or ADHD Diagnosis = 21.8 ± 3.9 , No ADD or ADHD Diagnosis = 14.4 ± 5.0 , $t(108) = 5.85$, $p < .001$). Individuals who exceeded the threshold of 15 or higher reported significantly higher scores on the first six questions of the ASRS than those who did not report a score of 15 or higher (15 or higher = 18.7 ± 3.4 , Less than 15 = 10.6 ± 2.4 , $t(91) = -13.45$, $p < .001$). Of the individuals who had not been diagnosed with ADD or ADHD, 43 reported scores on the first six questions of the ASRS of 15 or higher (n=43, 46.2%). Individuals who reported English as their first language reported significantly higher scores on the first six questions of the ASRS (English as first language = 15.9 ± 5.5 , English not as first language = 12.3 ± 4.5 , $t(108) = 2.09$, $p = 0.039$). We did not identify any significant differences in severity of self-reported ADHD symptoms between groups for sport, gender, academic year, athletic year, race, ethnicity, nationality, or history of concussion in the past 12 months. **Conclusions:** A substantial portion of the collegiate student-athletes surveyed reported symptoms that warrant further evaluation for ADD and ADHD despite never being diagnosed with either condition. ADHD has been shown to increase prevalence of concussion and musculoskeletal injury. Within the athletic population, ADHD often goes undiagnosed throughout childhood and early adolescence. When caring for large populations of athletes, a screening instrument for ADHD symptoms can be a valuable tool for clinicians seeking to identify patients who may require further evaluation. Better recognition of ADHD symptoms may lead to improvements in diagnosing and treating the condition.

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ABSTRACT

Purpose: Attention deficit hyperactivity disorder (ADHD) is a neuropsychiatric disorder that impacts an individual's ability to maintain attention span and focus their concentration at a normal level. While ADHD is one of the most well studied behavioral disorders, multiple researchers have stated the need for further research on the effects of ADHD on participation in sports. Therefore, the purpose of this study was to describe the prevalence of self-reported ADHD symptoms among collegiate student-athletes at an NCAA institution. A secondary purpose was to determine differences in self-reported ADHD symptoms based on demographic information and history of concussion. **Methods:** Subjects were selected for this study by retrospective review of pre-participation medical paperwork of the student-athletes of an NCAA Division II institution (n=418). A total of 110 student-athletes opened and completed the voluntary survey as part of pre-participation medical paperwork (access and response rate = 26.3%). Subjects were sent an electronic survey via email that collected demographic information and asked them to rate self-reported symptoms of ADHD using the Adult ADHD Self-Report Scale (ASRS). **Results:** Individuals who reported having been previously diagnosed with Attention Deficit Disorder (ADD) or ADHD reported significantly higher scores on the first six questions of the ASRS than those who had not (ADD or ADHD Diagnosis = 21.8 ± 3.9 , No ADD or ADHD Diagnosis = 14.4 ± 5.0 , $t(108) = 5.85$, $p < .001$). Individuals who exceeded the threshold of 15 or higher reported significantly higher scores on the first six questions of the ASRS than those who did not report a score of 15 or higher (15 or higher = 18.7 ± 3.4 , Less than 15 = 10.6 ± 2.4 , $t(91) = -13.45$, $p < .001$). Of the individuals who had not been diagnosed with ADD or ADHD, 43 reported scores on the first six questions of the ASRS of 15 or higher (n=43, 46.2%). Individuals who reported English as their first language reported significantly higher scores on the first six questions of the ASRS (English as first language = 15.9 ± 5.5 , English not as first language = 12.3 ± 4.5 , $t(108) = 2.09$, $p = 0.039$). We did not identify any significant differences in severity of self-reported ADHD symptoms between groups for sport, gender, academic year, athletic year, race, ethnicity, nationality, or history of concussion in the past 12 months. **Conclusions:** A substantial portion of the collegiate student-athletes surveyed reported symptoms that warrant further evaluation for ADD and ADHD despite never being diagnosed with either condition. ADHD has been shown to increase prevalence of concussion and musculoskeletal injury. Within the athletic population, ADHD often goes undiagnosed throughout childhood and early adolescence. When caring for large populations of athletes, a screening instrument for ADHD symptoms can be a valuable tool for clinicians seeking to identify patients who may require further evaluation. Better recognition of ADHD symptoms may lead to improvements in diagnosing and treating the condition.

Keywords: behavioral health, athletes, pre-participation exams

INTRODUCTION

Issues with maintaining attention among children have been attributed to a possible pathologic condition as early as 1902.¹ As research in the mental health field progressed, two of these conditions were identified as attention deficit hyperactivity disorder (ADHD) and attention deficit disorder (ADD). ADHD is a neuropsychiatric disorder that impacts an individual's ability to maintain attention span and focus their concentration at a normal level.^{2,3} ADD was described as a different disorder presenting with inattentiveness where hyperactivity is not present.⁴ Initially the conditions were separated with different diagnostic criteria. With the release of the DSM 5 criteria, the condition is now classified as ADHD with: predominantly hyperactivity/impulsivity symptoms, predominantly inattention, or a combination of symptoms.⁵ ADHD is relatively common, with 4%-11% of American children in the United States being diagnosed with the condition.^{3,6} While ADHD is one of the most well studied behavioral disorders, multiple researchers have stated the need for further research on the effects of ADHD on participation in sports.⁷⁻¹⁰

Previous research has shown that ADHD may increase the risk and prevalence of certain injuries encountered in sport. When attempting to determine the antecedents for concussions, researchers have consistently found that ADHD increases the risk and prevalence of concussion.^{7,8,11,12} This increased risk of concussion among ADHD patients has been cause for concern among researchers.^{7,8,11,12} Previous studies have indicated that ADHD predisposes patients to more severe, and longer lasting concussion symptoms.¹³ One study in particular found that college athletes with ADHD reported significant increases in anxiety and depression following a concussion when compared to college athletes without ADHD.⁹ Additionally, concussion patients with ADHD are significantly more likely to be referred for vestibular therapy.¹³ Adding to these concerns, individuals with ADHD appear to perform worse on concussion baseline testing than individuals without ADHD.^{10,14} Some potentially positive information is there does not appear to be a clear association between ADHD and worse clinical outcomes from concussions.¹⁵ Even with this in mind, previous history of ADHD is crucial information for sports medicine professionals when managing concussion patients.

In addition to increasing the risk and prevalence of concussions, ADHD has been documented as a risk for accidents and traumatic injuries in general.^{11,16,17} For instance, Chasle et al found that children with ADHD were more prone to forearm fractures than children without ADHD.¹¹ Despite these increased risks, there are potential benefits to sport participation for ADHD patients. The majority of child psychiatrists have reported that children and adolescents being treated for ADHD benefited from participating in organized sports.¹¹ Unfortunately, the full risks and benefits of sport participation for individuals with ADHD are not well understood.¹¹ One of the possible reasons for this paucity of research might be that population studies on the true prevalence of ADHD in athletes do not appear to have taken place.² Furthermore, athletes with ADHD may go undiagnosed throughout their adolescence.^{2,18} A possible reason for this delay in diagnosis may be that exceptional athletes may be advanced through their academic careers despite poor school performance to ensure ability to participate in competitions.¹¹ Another possible factor may be that parental influence and the structure associated with grade school provide means of compensating for ADHD symptoms.¹¹

In the available literature, there is a call for more research on the impact ADHD has on sports participation.^{11,16,17} However, without an accurate depiction of the prevalence of ADHD in sport it is difficult to fully determine the level of influence ADHD has. Therefore, the purpose of this study was to describe the prevalence of self-reported ADHD symptoms among collegiate student-athletes at an NCAA institution. A secondary purpose was to determine differences in self-reported ADHD symptoms based on demographic information and history of concussion.

METHODS

Design

This study was conducted using a retrospective analysis of data collected via electronic survey as part of normal pre-participation medical paperwork for collegiate student-athletes at an NCAA institution.

Respondents

Prior to identifying subjects, exemption was granted by The University of Texas at Tyler Institutional Review Board. Subjects were identified for this study by reviewing responses to an electronic survey that is a routine portion of preparticipation medical paperwork the student-athletes of an NCAA Division II institution (n=418). The email included an invitation to participate in a survey, an explanation of the goal of the survey, and a link from a web-based survey company (Qualtrics Inc., Provo, UT) in July 2022. A follow up email was sent two-weeks after the initial invitation attempting to solicit further responses, and the survey was closed a week after the second email was sent. A total of 110 student-athletes opened and completed the survey (access and response rate = 26.3%). Demographic information for subjects is presented in Table 1. All subjects were informed of the survey's purpose and an informed consent question was used to obtain permission to include their data.

Table 1. Totals and percentages for subject demographic information.

Demographic Factor	Criteria	Responses
Sex	Female	74, 67.3%
	Male	36, 32.7%
Race	White	90, 81.8%
	Black or African American	11, 10.0%
	Asian	2, 1.8%
	Native American/First Nations	2, 1.8%
	Other	5, 4.5%
Hispanic	Yes	14, 12.7%
	No	96, 87.3%
Born in the United States	Yes	96, 87.3%
	No	14, 12.7%
English as a first language	Yes	97, 88.2%
	No	13, 11.8%
Sport	Baseball	17, 15.5%
	Men's Basketball	3, 2.7%
	Women's Basketball	5, 4.5%
	Men's Golf	5, 4.5%
	Women's Golf	8, 7.3%
	Men's Soccer	6, 5.5%
	Women's Soccer	15, 14.6%
	Softball	8, 7.3%
	Spirit Squad	17, 15.5%
	Men's Tennis	1, 0.9%
	Women's Tennis	2, 1.8%
	Men's Track & Field	5, 4.5%
	Women's Track & Field	11, 10%
Women's Volleyball	7, 6.4%	
Academic Year	1 st	27, 24.5%
	2 nd	22, 20.0%
	3 rd	23, 20.9%
	4 th	22, 20.0%
	5 th	12, 10.9%
	6 th or higher	4, 3.6%
Athletic Year	1 st	28, 25.5%
	2 nd	28, 25.5%
	3 rd	26, 23.6%
	4 th	15, 13.6%
	5 th	9, 8.2%
	6 th or higher	4, 3.6%

Instrumentation

The survey began with the demographics section and informed consent question. Questions were also included to gather data on previous diagnosis of ADHD, use of ADHD medication, and history of concussion within the past 12 months. The remainder of the questions were taken from the Adult ADHD Self-Report Scale (ASRS). The ASRS is a validated tool for collecting information on self-reported symptoms consistent with ADHD.^{19,20} Previous work to validate the ASRS found the instrument to be both highly internally consistent and valid when compared to clinician administered ADHD symptom scoring.^{19,20} The ASRS consists of 18 questions, which ask patients to rate the occurrence of different events or sensations on a scale of "Never" to "Very Often" (See Appendix). Responses are assigned a numerical value (Never=1, Rarely=2, Sometimes=3, Often=4, Very Often=5). If patients report a summative score of 15 or higher on the first six questions of the scale, they are advised to seek qualified medical care for further evaluation for ADHD. In the event of a score of 15 or higher on the first six questions, the remaining 12 questions are used to gather more information about the nature of the patient's self-reported symptoms.

The survey consisted of 31 total questions. These questions included: one question obtaining consent to participate in the study, seven multiple choice questions regarding demographic information, two multiple choice question about previous diagnosis of ADHD or ADD, one multiple choice question on use of ADHD medication, one multiple choice question regarding diagnosis of a concussion within the past 12 months, and 18 multiple choice questions from the ASRS. The question regarding the diagnosis of ADD was retained in the survey in the event a student-athlete was being treated by a physician who was not adhering to the current DSM 5 criteria.

Data Analysis

Information from subject responses was downloaded and analyzed using a commercially available statistics package (SPSS Version 28, IBM, Armonk, NY). A total of 110 collegiate student-athletes consented and participated in the study. All 110 responses were included in the data analysis. Measures of central tendency (means, standard deviations, frequencies) were calculated where appropriate. One-way ANOVAs were performed to assess differences in ASRS scores between groups for sport, academic year, athletic year and race. Independent samples t-tests were performed to assess differences in ASRS scores between gender, ethnicity, country of origin, first language, history of concussion in the past 12 months, subjects diagnosed with ADD or ADHD and those who had not been diagnosed, individuals who had not been diagnosed with ADD or ADHD but scored 15 or higher on the first six questions of the ASRS and individuals who had been diagnosed with ADD or ADHD, and individuals who had not been diagnosed with ADD or ADHD but scored 15 or higher on the first six questions of the ASRS and individuals who had not been diagnosed with ADD or ADHD and scored lower than 15 on the first six questions of the ASRS. Significance was set at $p < 0.05$ a priori.

RESULTS

Prevalence of ADD or ADHD and Medication Use Among Collegiate Student-Athletes

Among 110 collegiate student-athletes who completed the ASRS, 15.5% ($n=17$) reported previously being diagnosed with ADD or ADHD. Of these student-athletes, 70.6% ($n=12$) reported taking prescribed medication for the treatment of ADD or ADHD. Of the individuals who had not been diagnosed with ADD or ADHD, 43 reported scores on the first six questions of the ASRS of 15 or higher ($n=43$, 46.2%).

Differences Between Demographics

Individuals who reported English as their first language reported significantly higher scores on the first six questions of the ASRS (English as first language = 15.9 ± 5.5 , English not as first language = 12.3 ± 4.5 , $t(108) = 2.09$, $p = 0.039$). We did not identify any significant differences in severity of self-reported ADHD symptoms between groups for sport, gender, academic year, athletic year, race, ethnicity, nationality, or history of concussion in the past 12 months.

Differences Between Diagnosed ADD and ADHD Subjects and Subjects without Diagnosis

Individuals who reported having been previously diagnosed with ADD or ADHD reported significantly higher scores on the first six questions of the ASRS than those who had not (ADD or ADHD Diagnosis = 21.8 ± 3.9 , No ADD or ADHD Diagnosis = 14.4 ± 5.0 , $t(108) = 5.85$, $p < 0.001$). Individuals who exceed the threshold of 15 or higher reported significantly higher scores on the first six questions of the ASRS than those who did not report a score of 15 or higher (15 or higher = 18.7 ± 3.4 , Less than 15 = 10.6 ± 2.4 , $t(91) = -13.45$, $p < 0.001$).

Individuals who reported being prescribed medication for ADD or ADHD reported significantly higher scores on the first six questions of the ASRS than those who had not (Medication = 22.3 ± 3.5 , No Medication = 14.7 ± 5.2 , $t(108) = 5.00$, $p < 0.001$). Among individuals diagnosed with ADD or ADHD, there was no significant difference between reported scores on the first six questions of the ASRS between those taking medication and those not taking medication ($p = 0.421$). Of the 17 individuals who reported being diagnosed with ADD or ADHD, only two individuals scored below 15 on the first six questions of the ASRS. These individuals reported taking medication for ADD or ADHD within 24 hours of completing the ASRS.

DISCUSSION

The purpose of this study was to describe the prevalence of self-reported ADHD symptoms among collegiate student-athletes at an NCAA institution. A secondary purpose was to determine differences in self-reported ADHD symptoms based on demographic information and history of concussion.

The majority of subjects reported having never been diagnosed with ADD or ADHD (84.5%, $n=93$). Within this group of subjects, 46.2% ($n=43$) reported a score of 15 or higher on the first six questions of the ASRS. It is important to note that the ASRS is a screening tool, and not a diagnostic instrument.^{19,20} That being said, a score of 15 or higher on the first six questions of the ASRS would warrant referral for further evaluation by a qualified healthcare provider. Given that previous research on the ASRS produced

a Cronbach's alpha of 0.88 and an intra-class correlation coefficient of 0.84 when compared to clinician rated evaluation of ADHD patients, these results affirm the assertion by Chasle et al that athletes with ADHD may go through childhood and early adolescents undiagnosed.¹¹

When comparing ASRS scores using different demographics measures, only speaking English as a first language yielded a significant difference ($t(108) = 2.09, p = 0.039$). There was no significant difference on ASRS scores when comparing gender, race, ethnicity, nationality, academic year, or athletic year. These findings suggest that ADHD is a cross-cultural concern when considering pathologies influencing performance and behavior. These findings affirm previous research that has reported an increased prevalence of ADD and ADHD among all genders, races, and ethnicities.²¹ Unfortunately, there is evidence to suggest that children who are Black or not raised in a home where English is primarily spoken are less likely to be diagnosed with ADD or ADHD in the United States.²¹ Of the 17 subjects in this study reporting a diagnosis of ADD or ADHD, only 3 (17.6%) reported their race as not being white. These findings appear to affirm the suggestions of previous research.²³

Possible reasons for this disparity in diagnoses include a lack of access to diagnostic and treatment modalities for racial and ethnic minority children.²³ Another reason may be that clinicians are being disproportionately responsive and communicative with white parents, leading to those parents being more likely to seek out an ADHD diagnosis and treatment for their children.²² This suggested reason would align with previously documented evidence that clinicians with an implicit bias toward non-white patients had shorter interactions and less communication with non-white patients.²⁴⁻²⁶ Language barriers may also be present, impacting the ability of parents and student-athletes to communicate ADHD symptoms to clinicians.²³ Efforts should be made to ensure that medical and education professionals reduce racial and ethnic disparities do not negatively impact the appropriate diagnosis of ADHD. This may include developing a network of culturally and linguistically competent professionals, and encouragement of patients and parents to recognize and report symptoms of ADHD.

Given the potential effect ADHD has on the prevalence of injuries including concussions and fractures, it is critical to accurately diagnose and treat student-athletes suffering from these conditions.^{7,8,11,12} The apparent underdiagnosis of ADHD among elite athletes may create barriers to appropriate care of pathologies affecting neurocognitive processes such as concussions.^{9,10,13} As such, access to an instrument to screen athletes for the symptoms of ADHD would be a valuable tool for healthcare professionals who specialize in caring for competitive athletes. The results of this study and previous literature suggest the ASRS is a valid, consistent, and easily administered instrument for identifying athletes who may benefit from further evaluation for ADHD.

Limitations

A possible limitation of this study was the relatively low number of subjects. While the total number of responses was similar to other survey-based studies conducted on collegiate athletes, an exhaustive and larger scale study would provide a more complete description of the efficacy of the ASRS as a screening tool for ADHD symptoms among athletes.^{27,28} This study provides a framework for conducting such a study.

Recommendations for Future Research

There is a need for further research into the prevalence, diagnosis, and treatment of ADHD among athletes. While sport participation has been shown to be beneficial for ADHD patients, previous research has demonstrated some of the potential risk factors associated with playing sports with ADD and ADHD. This study supports the need for more rigorous screening for ADHD among competitive athletes. However, as a clearer picture of prevalence of ADHD among athletes emerges, clinicians, researchers, and educators must work to mitigate the negative effects ADHD have on sport participation.

CONCLUSION

In conclusion, a substantial portion of the collegiate student-athletes surveyed reported symptoms that warrant further evaluation for ADHD despite never being diagnosed with either condition. ADHD has been shown to increase prevalence of concussion and musculoskeletal injury. Within the athletic population, ADHD often goes undiagnosed throughout childhood and early adolescence. When caring for large populations of athletes, a screening instrument for ADHD symptoms can be a valuable tool for clinicians seeking to identify patients who may require further evaluation. Better recognition of ADHD symptoms may lead to improvements in diagnosing and treating the conditions. The ASRS is a valid and consistent tool for screening for ADHD symptoms in collegiate student-athletes.

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APPENDIX

Adult ADHD Self-Report Scale Questions					
	Never	Rarely	Sometimes	Often	Very Often
<i>Part A</i>					
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?					
<i>Part B</i>					
7. How often do you make careless mistakes when you have to work on a boring or difficult project?					
8. How often do you have difficulty keeping your attention when you are doing boring or repetitive work?					
9. How often do you have difficulty concentrating on what people say to you, even when they are speaking to you directly?					
10. How often do you misplace or have difficulty finding things at home or at work?					
11. How often are you distracted by activity or noise around you?					
12. How often do you leave your seat in meetings or other situations in which you are expected to remain seated?					
13. How often do you feel restless or fidgety?					
14. How often do you have difficulty unwinding and relaxing when you have time to yourself?					
15. How often do you find yourself talking too much when you are in social situations?					
16. When you're in a conversation, how often do you find yourself finishing the sentences of the people you are talking to, before they can finish them themselves?					
17. How often do you have difficulty waiting your turn in situations when turn taking is required?					
18. How often do you interrupt others when they are busy?					

Scoring

1. Complete both Part A and Part B
2. Score Part A. If four or more responses are in the shaded boxes, the patient has symptoms highly consistent with ADHD in adults and further assessment is warranted.
3. Score Part B. Frequency scores provide additional information and can inform questions during formal diagnosis.