

NCAA Study of Substance Use and Abuse Habits of College Student-Athletes

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Objective: To determine the substance-use patterns of National Collegiate Athletic Association (NCAA) student-athletes for alcohol, amphetamines, anabolic steroids, cocaine/crack, ephedrine, marijuana/hashish, psychedelics/hallucinogens, and smokeless tobacco.

Design: Self-reported, anonymous, retrospective survey.

Participants: Male and female student-athletes from 30 sports competing at 991 NCAA Division I, II, and III institutions.

Main Outcome Measures: Respondents were queried about their use of eight categories of substances in the previous 12-month period. In addition, data were collected regarding substance use according to team, ethnicity, NCAA Division, reasons for use, and the sources for drugs.

Results: The overall response rate was 64.3% with 637 of 991 schools reporting with usable data on 13,914 student-athletes. For the eight categories of substance use, alcohol was the most widely used drug in the past year at 80.5%, followed by marijuana at 28.4%, and smokeless tobacco at 22.5%. Although anabolic steroid use was reported at 1.1% overall, some sports demonstrated higher use, and 32.1% obtained their anabolic steroids from a physician other than the institution's team physician. There were wide variations in the pattern of sub-

stance abuse according to sport. The results were also analyzed according to division, and it was found that the likelihood of alcohol, amphetamines, marijuana, and psychedelics use is highest in Division III. In addition, the probability of ephedrine use is highest in both Division II and III, while Division II had the highest likelihood of cocaine use. Finally, the results were analyzed according to ethnicity and we found that the likelihood of use of smokeless tobacco, alcohol, ephedrine, amphetamines, marijuana, and psychedelics is highest for Caucasian student-athletes.

Conclusion: The study demonstrates a wide variation of use across NCAA divisions and sports, as well as among ethnic groups. The majority of student-athletes engage in substance use, especially alcohol. According to the survey, substance use is highest among Division III student-athletes and also among Caucasians. By examining reasons for use, the study will assist professionals in designing specific interventions for various substances. This study provides a methodology for surveying a large number of NCAA student-athletes, which will be repeated every 4 years to identify trends in substance abuse.

Key Words: Substance-use patterns—National Collegiate Athletic Association—Student-athletes.

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It has been well known that student-athletes use a variety of drugs for a multitude of reasons. While student-athletes generally reflect the drug use patterns of their nonathletic peers, there are some significant differences. As a group, there is often a disincentive for student-athletes to use recreational drugs due to their negative effect on performance. This is balanced by the fact that student-athletes may be tempted to use ergogenic substances to improve their performance, and this sets them apart from their nonathlete peers. In addition, many student-athletes have the added concern of being subject to drug testing. Studies comparing athletes and nonathletes have been inconclusive, although some data have

demonstrated an increase in high-risk behaviors (including drug use), especially in some "male" sports.^{1,2}

The substance use and abuse patterns among intercollegiate student-athletes have been a long-standing concern among coaches, trainers, athletes, physicians, and administrators. This information is potentially helpful in designing educational and drug testing programs for college-age athletes. When this survey was conducted, the National Collegiate Athletic Association (NCAA) had jurisdiction over approximately 335,000 athletes who competed in 30 sports across three Divisions. Since 1985, the NCAA has conducted studies on the use and abuse habits of college student-athletes every four years.^{3–5} The current study represents an expansion of these surveys while building on previous information. The importance of this study is the snapshot that it affords at a particular point in time. It also challenges some of the myths regarding the association between athletes, athletic participation, and drug use. Due to the difference in methodology between this study and previous efforts, comparisons are difficult and will not be the focal point of this paper. The purpose of this study is to identify the

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current drugs of abuse, both for recreational and ergogenic use, and the reasons that student-athletes use these substances. In addition, this survey examined the patterns of drug use among teams, by NCAA division and by racial/ethnic group. This information will aid in targeting specific areas for education and drug testing.

SUBJECTS AND METHODS

Previous NCAA-sponsored studies surveyed 10 specific sports at 11 NCAA institutions in which the same 10 sports were studied at each of the 11 schools.³⁻⁵ An independent research team went to each school and collected these surveys. The study-wide response rate (calculated on the basis of number of athletes eligible to take the survey) was 78%.⁵ A new sampling plan was designed for this survey so that at least 10% of the NCAA member institutions that sponsor a given sport would be asked to survey their athletes in that sport. However, each institution only provided survey data on one or two sports at their particular school. This had the advantage that 30 NCAA championship sports (16 men's and 14 women's sports) were currently surveyed versus 10 sports in the previous studies. The sports surveyed are listed in Table 1. Another important difference was that the survey instrument was sent to the Faculty Athletics Representative (FAR), who administered the survey to the teams at his or her particular institution. Although the surveys were collected anonymously, this is a significant difference from previous studies.

The instrument itself was modeled after previous surveys,³⁻⁵ although it had been modified to reflect changing patterns of drug use. There were four sections that examined attitudes about drug use among student athletes, drug testing, effects of drug use, and the relationship of sports participation and academic performance. In addition, student-athletes were asked if they had used the following substances in the preceding 12 months: anabolic steroids, smokeless tobacco, alcohol, ephedrine, amphetamines, marijuana, hallucinogens, and cocaine. Overall, the survey instrument contained 160 variables for each student-athlete. The NCAA Research Committee and the NCAA Sub-committee on Drug Testing/

Education reviewed the study and instrument prior to distribution.

In addition to the admitted percentages of use, the survey also considered the reasons that student-athletes use a particular substance. This can be highly useful information in that it influences the type of educational intervention that may be helpful in deterring the use of a particular drug. The reasons for use were divided according to what are assumed to be the traditional recreational and ergogenic drugs.

A sampling plan was designed to ensure that at least 10% of NCAA member institutions that sponsor a given sport would be asked to participate, and that no single institution would be asked to give the survey to more than two teams. Following this, a computer program was devised that sampled the institutions at random and assigned one or two sports to each of 991 member schools in Division I, II, and III. One problem that was later discovered is that in the sports of men's and women's track and field, only athletes who also participated in cross country were sampled. All other track and field athletes were not surveyed, so there can be no comparison of track athletes to previous NCAA studies.

Following selection of institutions and sports, a letter was sent to the FAR at each member institution on September 11, 1996, detailing the methods for collecting the survey. This clarified that the participation of the student-athlete was voluntary, and that all responses were to be kept confidential. The FARs were instructed to give the survey to each particular team as a group. Preadressed express mail envelopes were provided in which the student-athletes were to directly deposit their surveys upon completion. Finally, the last student-athlete to complete his/her survey was asked to seal the envelope for mailing. If all of the above had been followed accurately, this last student-athlete and the FAR both signed a form stating that protocol had been correctly completed and the forms were returned by October 11, 1996.

ANALYSIS

Following the arrival of the data at the NCAA national office, it was verified that the protocol had been followed and the survey data were entered into a database. All of the surveys were checked for inconsistencies, and questionable data were eliminated from the database. The SPSS library of statistical packages was used to compile the descriptive statistics reported in the study. The usage rates reported are based only on those individuals who actually responded to questions regarding use of specific drugs. Chi-squared (χ^2) analysis was used to determine if sport division or ethnic category could differentiate drug-use patterns among collegiate student-athletes. While the χ^2 test is able to determine if group differences exist, a visual inspection of the category frequencies was used to determine which specific groups were different than others. The authors acknowledge that this test provides information regarding the statistical significance for the mathematical differences among the groups, but that the practical significance of the group differences is left for the reader to determine.

TABLE 1. List of sports surveyed

Men's sports	Women's sports
Baseball	Basketball
Basketball	Cross country
Cross country	Fencing
Fencing	Field hockey
Football	Golf
Golf	Gymnastics
Gymnastics	Ice hockey
Ice hockey	Lacrosse
Lacrosse	Skiing
Rifle	Soccer
Soccer	Swimming
Swimming	Tennis
Tennis	Volleyball
Water Polo	
Wrestling	

TABLE 2. Response rates according to NCAA division

	Institutions	No. responding	Response rate (%)	No. individuals (%)
Division I	306	233	76.1%	6123 (44%)
Division II	287	183	63.8%	3254 (23.4%)
Division III	398	221	55.5%	4537 (32.6)
Total	991	637	64.3%	13,914

RESULTS

The overall response rate among institutions was 64.3% with 637 of 991 schools responding with usable data. However, as can be seen in Table 2, there were significant differences in the response rate of each division. A greater percentage of Division I schools responded as compared with Division II and III institutions. While there was some variance in response rates, the representation across divisions was quite similar to the proportion of student-athletes who actually compete in the three divisions. Specifically, participation rates across the three divisions are as follows: 43.7% of all student-athletes are in Division I, 20% compete in Division II, and 36.5% compete in Division III. Overall, a total of 13,914 individual responses were received. The individual numbers according to gender and race are listed in Table 3.

In examining the 30 men’s and women’s sports, there were significant differences between sports. From Table 4, it can be seen that this is not a homogeneous group, and that there are wide ranges of use for each drug surveyed. Table 4 can also be used to compare the overall usage rates for the eight drugs according to gender, and it can be seen that there were statistically significant differences between men and women for six of the eight drugs surveyed.

The prevalence of drug use over the past year was also analyzed according to NCAA division, and these results are found in Table 5. We found that there was a significant relationship between which NCAA division a student-athlete competes in and his/her substance use at the $p < 0.01$ level. By examining the observed frequencies, we found that the likelihood of alcohol, amphetamines, marijuana, and psychedelics use is highest in Division III. In this same manner, we found the likelihood of

TABLE 3. Responses according to gender and ethnicity

Gender	Number	Percent
Men	9,183	66.0
Women	4,722	33.9
Missing	9	0.1
Race		
African American	1,883	13.8
White	10,850	78.0
Asian	259	1.9
Hispanic	515	3.7
American Indian	129	0.9
Missing	278	2.0

TABLE 4. Prevalence of substance use during the preceding 12 months according to gender and team ranges

Drug	Team range for men (mean)	Team range for women (mean)	Overall mean
Anabolic steroids*	0–5%	0–1.5%	1.1%
Smokeless tobacco*	5.7–55%	1.4–22.3%	22.5%
Alcohol	68.6–94.8%	75.3–95.9%	80.5%
Ephedrine*	0–18.8%	0–3.3%	3.5%
Amphetamine	0–8.8%	0–5.3	3.1%
Marijuana*	20–58.6%	12.1–51.5%	28.4%
Psychedelics*	0–17.6%	0–14.3%	5.6%
Cocaine*	0–5.8%	0–3%	1.5%

*, denotes a p value of < 0.01 comparing men and women.

ephedrine use is highest in both Division II and III, while Division II has the highest likelihood of cocaine use.

Another finding of the study was the ethnic/racial differences in drug use. This survey examined the use of drugs and alcohol according to racial/ethnic background, and is summarized in Table 6. We found a significant relationship between which ethnicity a student-athlete identified himself/herself and his/her substance abuse habits at the $p < 0.01$ level. Examining the observed frequencies, we found that the likelihood of use of smokeless tobacco, alcohol, ephedrine, marijuana, and psychedelics is highest for Caucasian student-athletes.

Table 7 examines the reasons for using recreational drugs and yields some interesting findings. If one combines the percentages for “recreational or social” and “makes me feel good,” it can be seen that over 80% of student-athletes use smokeless tobacco, alcohol, marijuana, psychedelics, and cocaine as a recreational drug. While ephedrine had been considered by many to be used by student-athletes as a recreational drug, the study demonstrates that of those who used ephedrine, one-half used it to increase performance. Interesting results were also found in the reasons for using a traditional ergogenic drug, amphetamines. As detailed in Table 8, only 9.2% of the respondents who admitted to using amphetamines took it to specifically improve athletic performance.

The study also provided information on attitudes towards drug testing. Of those surveyed, 66.9% either agreed or strongly agreed with the statement, “All college athletes should be tested by the NCAA,” and 65%

TABLE 5. Prevalence of substance use according to NCAA division

Drug	Division I (n = 6,123)	Division II (n = 3,254)	Division III (n = 4,537)
Amphetamines	2.5%	3.3%	3.7%*
Anabolic steroids	1.2%	1.1%	1.3%
Ephedrine	3%	4.2%*	3.8%*
Alcohol	79.2%	79.7%	82.6%*
Cocaine/crack	1.2%	2%*	1.5%
Marajuana/hashish	26.4%	29.2%	30.3%*
Smokeless tobacco	21.7%	23.8%	22.6%
Psychedelics	4.6%	6.1%	6.6%*

*, denotes a p value of $p < 0.01$ for comparisons between divisions.

TABLE 6. Prevalence of substance use according to ethnicity

Drug	Caucasian (n = 10,850)	African-American (n = 1,883)	Other (n = 903)
Amphetamines	3.2%*	1.3%	3.2%
Anabolic steroids	1.1%	1.1%	2.1%
Ephedrine	3.8%*	1.2%	3.5%
Alcohol	84.3%*	59.6%	77.2%
Cocaine/crack	1.6%	0.6%	1.3%
Marjuana/hashish	29.3%	23.5%	27%
Smokeless tobacco	26%*	5.4%	16%
Psychedelics	6.5%*	1.2%	4.5%

*, denotes a p value of $p < 0.01$ comparing ethnic groups.

thought that all college athletes should be tested by their school. According to the survey, a majority of student-athletes support drug testing and believe that it deters athletes from using drugs. Furthermore, 91% felt that all Olympic athletes should be tested, and 78% agreed that all professional athletes should be tested.

Finally, the survey focused on anabolic-androgenic steroids. It has traditionally been very difficult to get an accurate assessment of anabolic steroid use, and this survey put the overall usage rate for the preceding 12 months at 1.1%. To those who work with athletes, this may seem like a low number, but this rate of usage is supported by other questions in the survey. For example, the survey asked "How many of your teammate would you estimate have used anabolic steroids in the last 12 months?"; 95.5% gave the response "none" or "almost none." In terms of reasons for use, the users of anabolic steroids were split with 47% stating their main reason for use being performance enhancement, and 51% to use as a recovery from an injury. This latter figure was divided into 28% stating use as a recovery from a sport-related injury and 23% from a nonsport-related injury. There did not seem to be any significant recreational usage of anabolic-androgenic steroids.

The survey also examined where the student-athletes obtain their steroids. Table 9 lists where athletes were likely to obtain anabolic steroids. What is most striking about these responses is the fact that almost 40% of the athletes who admitted to using anabolic steroids obtained them from a physician. In fact, the leading source was from an outside physician, which was almost equal to the next two responses combined. While the relative numbers of reported anabolic-androgenic steroid users remains low, the availability of these substances is a concern. Indeed, only 0.7% of the respondents stated "They're hard to get" as a reason not to use or to have stopped the use of anabolic-androgenic steroids.

In addition, the survey for the first time inquired about the use of other substances, such as dietary supplements. A total of 13.3% stated that they had used creatine in the previous 12 months, with 8.5% admitting to the use of amino acids and 0.6% having used dehydroepiandrosterone (DHEA). These were the only supplements specifically queried, although another 10.4% revealed that they had used other supplement products.

DISCUSSION

This study attempted to assess the substance use and abuse habits of NCAA student-athletes on a much larger scale than previously reported to better understand NCAA athletes. While student-athletes as a group share many qualities due to their athletic participation, previous studies have demonstrated wide variations in attitudes and behavior.^{1,2} For example, some sports place a premium on strength and weight gain, while others emphasize leanness. By surveying 30 sports, this article expands on preceding studies to give a broad examination of NCAA athletes.

The first finding concerns the use of substances at the various NCAA divisions. The NCAA division structure is defined by many variables, including the number of sports an institution sponsors and the amount of athletically related scholarships available. In general, Division I institutions sponsor more sports, provide more athletic scholarships, and have longer playing seasons than Division II and Division III institutions. Division III schools offers no athletic scholarships. It may be hypothesized that the more highly skilled athletes are attracted to the divisions where there are longer playing seasons and more scholarship money, or that overall skill level decreases across divisions.⁶ While the general public may assume that high-profile Division I athletics have the greatest problem with substance abuse, Table 5 demonstrated the opposite to be true.

For most drugs, Division I had the lowest percentage of use, while Division III had the highest usage rate for five of the eight drugs surveyed. In fact, there was statistical significance at the $p < 0.01$ level for Division III having the highest likelihood of drug use for alcohol, amphetamines, marijuana, and psychedelics. In addition, Division II and III shared a statistical significance for highest ephedrine use at the $p < 0.01$ level. Division II alone had a statistically significant higher use of cocaine. There are several potential explanations. The most likely is the vast discrepancy in institutional drug testing and drug education programs according to division. According to the 582 institutions that responded to the 1999 NCAA survey on institutional drug testing and education, 75% of Division I schools conduct a drug testing program. This is in contradistinction to 43% of Division II and 8% of Division III.⁷ The degree of drug testing conducted by the NCAA also varies according to Division. The NCAA tests all three divisions at championship events, and performs year-round random testing at Division I and II in football and Division I men's and women's track and field. Division III is only subject to NCAA testing at championship events.

In addition to the differences in drug testing between the divisions, Division I schools might have much larger budgets for drug and alcohol educational programs for their student-athletes as compared with their lower division counterparts. According to the NCAA survey, 76% of Division I institutions reported operating drug education programs, versus 50% at Division II and 41% at Division III.⁷ The current study suggests that Division II

TABLE 7. Reasons for using recreational drugs

Reason for use	Smokeless tobacco	Alcohol	Ephedrine	Marijuana	Psychedelics	Cocaine
Recreational or social	54.4%	83.4%	19.7%	61.2%	53.6%	42.1%
Makes me feel good	29.3%	13.7%	15.5%	34.7%	43.8%	44.7%
Deal with stress of athletics	2.3%	0.6%	3.4%	0.4%	0.3%	5.3%
Improve performance	0.8%	0.2%	50.8%	0.6%	1.3%	3.9%
Deal with stress of college	13.2%	2.1%	10.5%	3.1%	1.1%	3.9%

and III schools may need to examine their policies regarding drug testing and drug education to address the issues of drug use at their schools.

The study demonstrated the patterns of drug use among a broad section of NCAA student-athletes as summarized in Table 4. It can be seen that there are wide ranges of drug use when grouped according to specific sports. While some drugs had fairly homogenous usage rates among all athletes, e.g., alcohol, others enjoyed wide ranges. For example, smokeless tobacco use among men's teams ranged from a low of 5.7% to a high of 55%. Clearly, an intervention program for this drug would need to target specific teams. It is also interesting to note that the female student-athletes had significantly lower usage rates for six of the eight categories. The exceptions being alcohol and amphetamines. This seems to suggest that participation in sports is not the sole determining factor in substance use and abuse.

The study also examines the reasons for uses of various recreational drugs in Table 7. This has assisted the NCAA in designing programs to deter the use of specific drugs. For example, although ephedrine had been considered by many to be a recreational drug of abuse, this study demonstrated that one-half of the users consumed it to increase performance. Based in part on this information, the NCAA added ephedrine to the banned substance list and began screening for it with drug testing in 1998.

An additional finding relating to a specific drug is the responses to the reasons for using amphetamines. Amphetamines have been considered mainly an ergogenic substance for many years, even having a "Sunday Syndrome" applied to its use by professional football players.⁸ However, in the past few years, the increasing availability of methamphetamine has led to its use as a recreational drug. At first glance, Table 8 seems to support recreational use as the leading reason in that 24.8% used amphetamines for social or personal reasons. However, it is possible that the 21.1% who responded "to give me

more energy" may be employing it as an ergogenic aid. In addition, the 13.5% who used amphetamines to lose weight may be doing it for a sports-related reason, i.e., in a sport where reduced weight is an advantage. The drive for weight loss may in part explain why amphetamine use was one of the two drugs not to follow the trend of significantly lower use for women as compared with men. This demonstrates the difficulty in interpreting reasons for use, and further study will be necessary to better define this area. As with all substances, familiarity with the reasons for use can be helpful in devising a successful intervention program.

Another finding of the study was the ethnic/racial differences in drug use. This survey examined the use of drugs and alcohol according to racial/ethnic background. Perceptions about drug use are often influenced by stereotypes derived from anecdotal media reports regarding high-profile athletes and substance abuse. As can be seen from Table 6, for five of the eight drug categories, the usage rates for Caucasians were statistically significantly higher than the other groups. The differences were especially striking for alcohol and smokeless tobacco. This information can be useful in that it may expose false stereotypes and influence the development of programs to address problems with substance abuse.

In the examination of anabolic-androgenic steroids, while it is not surprising to see that student-athletes use them for performance enhancement, it is extremely disturbing to note that 38% of anabolic steroid users stated that they obtained the drug from either a team physician or another physician. It was hoped that when anabolic-androgenic steroids were reclassified as a Schedule III drug, it would alert physicians to their dangers. From the results of this survey, this is not the case, and further education and/or sanctions may be needed to correct this problem. It must be emphasized that it is unethical, as well as malpractice and illegal, to provide anabolic-

TABLE 8. Reasons for using amphetamines

Main reason for using amphetamines	Percentages
To improve athletic performance	9.2%
For a sports-related injury	2.7%
For a nonsports-related injury or illness	9.7%
For social or personal reasons	24.8%
To give me more energy	21.1%
As an appetite suppressant to lose weight	13.5%
Other	18.9%

TABLE 9. Source for obtaining anabolic-androgenic steroids (AAS)

Source for AAS	Percentage
Coach or athletic trainer	3.8%
Team physician	5.7%
Other physician	32.1%
Teammate or other athlete	20.8%
Friend or relative	17.0%
Pro scout or agent	9.4%
Other source	11.3%

androgenic steroids without a legitimate medical indication.

There are of course limitations with any study. While this survey had the advantage of receiving responses from a large number of athletes who participated in many different sports, there were also a large percentage of schools who did not respond. However, we did not sample the nonresponding schools, and this could have been especially significant given the discrepancy of response rates by division. This will be attempted during the 2001 iteration of the study. While there were statistical differences in response rates according to Division at the $p < 0.05$ level, logistic regression reveals that this accounts for only 0.9% of the overall variation. Additionally, this study did not calculate an overall study-wide response rate to account for student-athletes who may have been absent from the team meeting when the survey was given. This will be corrected, along with including all track and field athletes, in the next survey. Another potential limitation was the role of the FARs. Although great care was taken to ensure that the FARs administered the surveys anonymously, it is difficult to determine if their presence had any influence over the responses.

Overall, great care was taken with the survey to reflect the demographics of all student-athletes competing for NCAA schools. The results of the survey were used to aid the NCAA in setting policy regarding drug testing. In addition, individual schools use the data to refine their drug education and drug testing programs. While a great deal of attention is focused on drug testing, it is clear that alcohol (which is not generally included for testing) is the leading recreational drug of choice among NCAA student-athletes. All institutions should be aware of this fact and address it accordingly.

Future directions for this survey will address the increasing use of dietary supplements as ergogenic aids. Although there were questions regarding the use of supplements, the survey was collected in 1997 before the epidemic of over-the-counter nutritional supplements began. The sale of supplements such as androstenedione and creatine have skyrocketed, especially with the publicity surrounding baseball player Mark McGwire during his chase for the home run record in 1998. These and many other dietary supplements are freely available in

stores and through the Internet. At the time of this survey in 1997, many NCAA Division I institutions provided supplements, e.g., creatine, directly to their student-athletes. As of August 1, 2000, NCAA legislation markedly restricts the types of supplements that may be distributed by Division I institutions. Supplement use is a rapidly changing area, and it would be important to include more questions about dietary supplements in future surveys of NCAA student-athletes.

Having demonstrated that the survey collection method yielded a large amount of usable data, it is planned that this type of survey will be repeated every 4 years. This will allow for comparisons and trends to be tracked as patterns of drug use emerge and new interventions are attempted. It is incumbent on those who work with NCAA athletes to be aware of new drugs and design interventions based on the reasons for drug use.

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