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## A national study of substance use behaviors among NCAA male athletes who use banned performance enhancing substances

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### Abstract

**Background**—Reports of illicit substance use by college athletes have become commonplace in recent years, yet comparatively little effort has been put forth by the research community to understand these behaviors.

**Methods**—Data for this study came from a large, national dataset collected by the National Collegiate Athletic Association (NCAA). This study compared substance use behaviors of male undergraduate student athletes who reported using ergogenic performance enhancing substances (e.g., anabolic steroids and peptide hormones) during college (PES users) to those who did not (PES non-users).

**Results**—A consistent pattern of higher substance use rates was observed among PES users compared to non-users, including heavier drinking, higher prevalence rates of cigarettes, marijuana, amphetamines, narcotics, and a variety of permissible and impermissible dietary supplements. An unexpected finding was that there were large discrepancies in reported prevalence rates between similar or overlapping survey items (e.g., past year use of “narcotics” versus “I have taken Vicodin, Oxycontin or Percocet with/without a prescription”).

**Conclusions**—These findings suggest that male college athletes who use PES while in college demonstrate a general tendency to engage in alcohol and drug use behaviors, regardless of whether these behaviors improve or impede athletic performance. The results further suggest that college athletes may not fully appreciate drug categorizations that are commonly employed to gauge substance use behaviors. Changes to drug education and prevention programs may be needed to enhance understanding of drug properties and actions.

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**Contributors** All authors were involved in the design of the study. Dr. Buckman obtained access to the NCAA dataset, designed the analytic plan, and wrote the first draft of the paper. Ms. Farris and Dr. Yusko managed the literature searches and summaries of previous related work. All authors contributed to and have approved the final manuscript. The authors also note that statistical analyses were performed by the National Collegiate Athletic Association. The conclusions expressed in this article, however, are those of the authors and do not reflect the views of, and should not be attributed to, the National Collegiate Athletic Association or any of its members.

**Conflict of interest** The authors declare that they have no conflicts of interest.

## Keywords

Student athlete; College; Sport; Alcohol; Marijuana; Steroid

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## 1. Introduction

Athletes at all levels of performance are inundated with conflicting information about the benefits and drawbacks of performance enhancing substances (PES; Avois et al., 2006; Hartgens and Kuipers, 2004). For college athletes, the National Collegiate Athletic Association (NCAA) attempts to provide access to relevant and up-to-date information about the risks and consequences of recreational drug and PES use by publishing a list of banned substances each year (NCAA, 2012a) and participating in the National Center for Drug Free Sport's Drug Resource Exchange Center ([www.drugfreesport.com/rec/](http://www.drugfreesport.com/rec/)). In addition, the NCAA and individual universities around the country routinely drug test for PES and recreational drugs, and have policies in place to deter use. Substance use infractions (e.g., failing a drug test) can potentially result in significant consequences, including losing eligibility to participate in regular or post-season competition for at least one calendar year, having championships, records, or awards revoked, having points deleted from team scores, and having team standings adjusted (Bylaw 18.4.1.5.1.; NCAA, 2011). Despite these efforts, the use of recreational drugs and PES by college athletes persists (NCAA, 2012b).

To date, we are aware of only two studies that have addressed the prevalence of PES use among male college athletes (Buckman et al., 2009; McCabe et al., 2007). When compared to their non-using male peers, PES-using male athletes report greater sensation seeking tendencies, more maladaptive reasons for substance use (e.g., coping motives), and fewer protective behaviors while drinking or using drugs (e.g., using a designated driver, avoiding drinking games; Buckman et al., 2009). Moreover, male college athletes who use anabolic steroids (McCabe et al., 2007) or a broad array of PES including stimulants, hormone precursors, and nutritional supplements (Buckman et al., 2009) were more likely to report frequent and heavy alcohol use, alcohol-related problems, and use of other recreational drugs (tobacco products, marijuana, cocaine, psychedelics, and non-prescribed prescription drugs) compared to their non-using athlete counterparts. This suggests that male PES-using college athletes have a general inclination towards using substances to achieve *any* desired outcomes (e.g., enjoying the party, improving academic performance, sleeping), regardless of whether the drug-using behavior promotes or impedes athletic performance. These prior investigations, however, focused either solely on anabolic steroids rather than the broader class of PESs (McCabe et al., 2007) or were limited by small samples (Buckman et al., 2009); thus they require replication. If confirmed, these results would challenge the assumption that PES users are distinct from recreational drug users in terms of substance use risk profiles.

The present study extends earlier studies by using a large, nationally-representative sample of male college athletes to directly examine whether PES users specifically use substances that enhance performance or whether they demonstrate a more general pattern of substance use. PES users and non-users were compared on substances that have no real or perceived health or performance benefits, substances that can serve dual purposes (i.e., enhance performance but are also commonly used by college students for social-recreational purposes), and drugs that are specifically taken by athletes to improve performance. The limited research on this topic thus far supports the following hypothesis: compared to non-PES using male athletes, PES users will have higher rates of other substance use (e.g., alcohol, cigarettes, marijuana, cocaine) regardless of their performance effects. If this

hypothesis is supported, it has far-reaching implications for the physical and psychological health of the college student athlete.

## 2. Methods

### 2.1. Participants

Participants were 11,556 male undergraduate college student athletes recruited as a part of the study entitled, “2008–2009 National Study of Substance Use Trends among NCAA College Student-Athletes” (NCAA, 2012b). Athletes from 1076 NCAA member institutions were included in the sample. Ninety-eight percent of the sample reported being between 18 and 23 years of age. Approximately 75% of participants reported their race as White; 15% identified as Black/African American; 5% as Hispanic or Latino; 2% as American Indian/Alaskan Native; 2% as Asian; and 1% as Native Hawaiian or Pacific Islander.

### 2.2. Procedures

The research survey and procedures were approved by the NCAA Research Review Board. Participation in the study was voluntary and anonymous. All data were collected by the NCAA using a stratified random sampling procedure (i.e., between one and three teams were sampled from each institution) starting in January 2009. Approximately 15% of teams within each NCAA-sponsored sport were asked to participate. Surveys were administered to the selected teams on campus by a faculty athletics representative (FAR), who served as a liaison between the institution, the institution’s athletic department, and the NCAA. Upon completion, the surveys were mailed to an independent vendor, who scanned the surveys into an electronic database and reviewed data for integrity. All data were collected in 2009; 20,474 male and female student-athletes across 23 different sports, at all three division levels, participated. Only male undergraduate student athlete data were analyzed in the present study.

### 2.3. Measures

The self-report survey included 28 items related to (1) institutional and demographic information; (2) opinions and experiences related to social and performance enhancing substance use and drug testing; and (3) sources of information about and supply of substances. Details of the full survey and sample are available in NCAA (2012b). To address the hypothesis of the current study, data from a subset of these survey items were analyzed by the NCAA and are reported here.

**2.3.1. Group classification—**Male undergraduate college athletes were categorized as either PES users or non-users based on their answer to one survey item, “Which of the following ergogenic aids (i.e., muscle building aids) have you taken while in college?”. Participants were asked to mark all that apply: I have not taken any of the items listed below, andro or norandro product, beta-methyl butyrate (HMB), clenbuterol, dehydroepiandrosterone (DHEA), epitestosterone, erythropoietin (EPO), gamma hydroxybutyrate (GHB), human chorionic gonadotropin (HCG), human growth hormone (HGH), testosterone, and testosterone boosters. The majority of these ergogenic aids are considered anabolic steroids or synthetic hormones that promote natural steroid production. If students reported use of any of these banned or impermissible substances, they were categorized as PES users. Other survey items further assessed aspects of PES use, but these items differed in the time period assessed or the inclusion of non-banned and permissible PESs and thus were not part of the group classification procedure.

**2.3.2. Demographic measures—**Background information from two survey items was used in the present study: “What is your school’s NCAA Division?” (Division I, Division II,

or Division III) and “How do you describe yourself?” (mark all that apply: American Indian or Alaskan Native, Asian, Black or African American, Hispanic or Latino, Native Hawaiian or Pacific Islander, White, Other). A small number of participants self-reported their race as American Indian/Alaskan Native, Asian, Native Hawaiian or Pacific Islander, or Other, therefore these racial categories were combined. Individuals could self-identify as more than one race/ethnicity, but very few did so; thus, analysis of racial groups did not include these data; substance use behavior analyses, however, did.

**2.3.3. Alcohol and drug use behavior measures**—Alcohol and drug use was measured from seven survey items. Recency of drug use was surveyed with an item that asked, “Please indicate your experience with the following substances: alcohol, amphetamines, anabolic steroids, cigarettes, cocaine, ephedrine, marijuana, narcotics, spit tobacco”. Response options were Never Used, Used in the last 30 days, Used in the last 12 months, or Used, but not in the last 12 months. A Glossary of Terms was presented at the beginning of the survey to provide examples for each drug class (e.g., examples of amphetamines included Adderall, Methamphetamine, and Ecstasy).

Additional information about the use of the aforementioned substances was collected from survey items that queried about the use of specific drugs or drug classes. Alcohol use was further measured by responses to the following question: “When you drink alcohol, typically how many drinks do you have in one sitting?” Athletes could mark one of 11 possible responses (I do not drink alcohol, or any number of drinks from 1 through 10+). These data were used to compute (1) typical quantity of alcohol consumed per sitting and (2) binge drinking (Wechsler et al., 2002) based on dichotomized responses to the typical quantity of alcohol use survey item (0 = non-binge drinker, reporting that typical drinking quantities were less than 5 drinks per drinking episode, 1 = binge drinker, reporting typical drinking quantities of 5 or more drinks per drinking episode).

Stimulant use, with specific reference to Adderall (amphetamine/dextroamphetamine) and Ritalin (methylphenidate), was measured using an item that asked, “Within the last 12 months, have you taken any attention deficit-hyperactivity disorder (ADHD) medications with or without a prescription?” Participants were asked to mark all that apply: (1) I have not taken attention deficit-hyperactivity disorder (ADHD) medications with or without a prescription; (2) I have taken Adderall OR Ritalin with a prescription; (3) I have taken Adderall OR Ritalin without a prescription; and, (4) I have taken other attention deficit-hyperactivity disorder (ADHD) medications. Individuals who endorsed response options (2) or (3) were identified as past year users of stimulant-based ADHD medications.

The use of pain killers was measured with an item that asked, “Within the last 12 months, have you taken any of these pain management medications with or without a prescription?” Response options specifically referenced Vicodin, Oxycontin, and Percocet, all of which contain narcotics. Participants were asked to mark all that apply: (1) I have not taken pain management medications with or without a prescription; (2) I have taken Vicodin, Oxycontin or Percocet with a prescription; (3) I have taken Vicodin, Oxycontin or Percocet without a prescription; and, (4) I have taken other pain management medications. Individuals who endorsed response options (2) or (3) were identified as past year users of narcotic-based pain management medications.

The use of asthma medications, with specific reference to steroid inhalers, was assessed by asking, “Within the last 12 months, have you taken any of these asthma medications with or without a prescription?” Participants were asked to mark all that apply: (1) I have not taken asthma medications with or without a prescription; (2) I have taken Albuterol (e.g., Proair, Proventil) with a prescription; (3) I have taken Albuterol (e.g., Proair, Proventil) without a

prescription; and, (4) I have taken other asthma medications. Individuals who endorsed response options (2) or (3) were identified as past year users of steroid-based asthma medications. Prescription use of steroid inhalers is permissible, but non-prescription use is banned.

The use of dietary and other supplements that are used to improve performance (and may or may not be banned/impermissible) was evaluated in two survey items, which asked participants to report use of the following substances while in college. Response options to the first item were: I have not taken any of the items listed below; amino acids; chromium; creatine; glucosamine; general multivitamin; multivitamin with caffeine; and multivitamin and mineral with other additives. None of these supplements are specifically banned by the NCAA, but some are impermissible (i.e., universities may not distribute or supply to their student-athletes) and caffeine concentrations are restricted (NCAA, 2012a). Response options to the second item were: I have not taken any of the items listed below; diuretics; energy boosters; weight loss products; protein products; weight gain products; and, sleep aid (e.g., Ambien). This latter survey item lists categories rather than specific agents. Some of these categories (e.g., diuretics) may include banned agents and the NCAA specifically warns that supplements can be contaminated with banned agents (NCAA, 2012a).

#### 2.4. Data analytic plan

All data were anonymous and no identifying information about the athlete or institution was collected. NCAA research personnel conducted all data coding, weighting, and analysis for this study. As in prior studies by the NCAA (NCAA, 2012b), data were statistically weighted as a function of gender, sport, and NCAA division to correct for oversampling or differential group response rate. Different weighting functions were developed for aggregating across gender-specific sport within division, across division within gender-specific sport, and across gender, sport, and division. Descriptive statistics, Pearson chi-square tests, and *t*-tests were performed using SPSS 19.0. Due to the survey design, there were some missing data; however, high response rates (>94%) were noted for all items assessed. To maintain the family-wise type I error rate at an acceptable level, a more conservative alpha ( $p < .001$ ) was used.

Three chi-square tests analyzed race/ethnicity differences by PES group designation: (1) athletes who self-identified as Hispanic or Latino were compared to all other participants (i.e., who did not affiliate with Hispanic origins), (2) athletes who self-identified as White versus Black/African American, and (3) athletes who self-identified as White versus another race (i.e., American Indian/Alaskan Native, Asian, Native Hawaiian or Pacific Islander, or Other). Differences in drinking and other substance use behaviors between PES users and non-users were examined using *t*-tests and chi-square tests.

### 3. Results

Of the 11,556 male undergraduate student athletes who completed the survey, 11,003 responded to the group classification item (on ergogenic aid use). Eighteen responses were discrepant (i.e., reporting use of an ergogenic aid listed and also endorsing “I have not taken any of the items listed below”) and were therefore excluded. Of the remaining valid responses, 3.1% ( $n = 339$ ) endorsed using at least one of the 11 PES agents listed; these individuals were categorized as PES users based on their self-reported use of specific anabolic steroids, synthetic hormones, blood doping agents, and other muscle building substances.

Rates of PES use were non-significantly different as a function of NCAA division level: Division I (2.4%), Division II (3.8%), and Division III (3.2%;  $\chi^2 = 10.88$ ,  $df = 2$ ,  $p < .004$ ).

Rates of PES use by race were not statistically significant at the more conservative  $p < .001$ ; however, male athletes who self-reported their race as White were nearly twice as likely to be classified as PES users compared to those who self-reported their race as Black/African American (3.3% versus 1.7%, respectively;  $\chi^2 = 13.07$ ,  $df = 1$ ,  $p < .01$ ).

In addition to the one survey item that was used to create PES use group categories, additional information about the use of anabolic steroids, steroid inhalers, and dietary and other supplements thought to enhance performance was assessed in separate survey items. PES users, compared to non-users, reported greater past-month, past-year, and lifetime anabolic steroid use ( $\chi^2 = 851.9$ ,  $df = 3$ ,  $p < .001$ ; Fig. 1). Interestingly, less than 25% of male athletes who were classified as PES users specifically endorsed anabolic steroid use. Among those who reported using albuterol with or without a prescription ( $n = 1095$ ; 14 of whom endorsed use both with and without a prescription), PES users compared to PES non-users reported greater past year use of non-prescribed albuterol (11.0% versus 0.8%, respectively). Albuterol is a steroid inhaler that may be used as a performance enhancer by some athletes and is banned by the NCAA when used without a prescription. PES users, compared to PES non-users, also reported greater past-month, past-year, and lifetime ephedrine use ( $\chi^2 = 257.6$ ,  $df = 3$ ,  $p < .001$ ; Fig. 1) and a consistent pattern of significantly higher rates of dietary and other supplements use during college (Table 1; note that all supplements surveyed are touted to enhance performance, but not all supplement categories assessed include substances that are banned or considered impermissible).

Recency of alcohol use differed between PES users and nonusers ( $\chi^2 = 50.5$ ,  $df = 3$ ,  $p < .001$ ; Fig. 1). Notably, 83.0% of PES users reported using alcohol in the past 30 days compared to 65.3% of PES non-users; both prevalence rates are quite high. PES users ( $7.3 \pm 2.8$ ) versus non-users ( $6.2 \pm 2.9$ ) also reported significantly greater quantities of alcohol per drinking occasion [ $t(9166) = 6.44$ ,  $p < .001$ ] and were more likely to report binge drinking as their “typical” behavior (80.2% versus 68.3%, respectively,  $\chi^2 = 20.1$ ,  $df = 1$ ,  $p < .001$ ). The prevalence of cigarette ( $\chi^2 = 88.8$ ), spit tobacco ( $\chi^2 = 104.8$ ), marijuana ( $\chi^2 = 122.1$ ), and cocaine ( $\chi^2 = 145.2$ ) use was significantly higher among PES users than non-users (all  $df = 3$ , all  $p < .001$ ; Fig. 1). In all cases, use of these recreational drugs in the past month, past year, and lifetime was twice as high (or higher) among PES users compared to non-users.

PES users reported greater “amphetamine” use compared to PES non-users ( $\chi^2 = 111.9$ ,  $df = 3$ ,  $p < .001$ ; Fig. 1). For this item, 325 PES users and 10,405 PES non-users provided valid responses; thus, based on self-reported past 30 day and past 12 month use, approximately 381 male NCAA athletes in this survey reported using amphetamines in the past year. In a separate item, 1311 male athletes reported past year Adderall or Ritalin use with or without a prescription (48 of whom reported use both with and without a prescription). Valid responses for this item were provided by 335 PES users and 10,535 PES non-users. This latter item also suggested that PES users were nearly three times more likely to report Adderall or Ritalin use without a prescription than PES non-users (20.0% versus 7.1%, respectively).

PES users, compared to non-users, were more likely to report “narcotic” use ( $\chi^2 = 112.2$ ,  $df = 3$ ,  $p < .001$ ; Fig. 1). For this item, 325 PES users and 10,366 PES non-users provided valid responses; thus, based on self-reported past 30 day and past 12 month use, approximately 332 male NCAA athletes in this survey reported using narcotics in the past year. In a separate item that gauged past year “pain management medication” use, 1868 student athletes endorsed either “I have taken Vicodin, Oxycontin or Percocet with a prescription” or “I have taken Vicodin, Oxycontin or Percocet without a prescription” (137 of whom reported use both with and without a prescription). Vicodin, Percocet, and Oxycontin are all

narcotics. Valid responses for this item were 10,569 for PES non-users and 335 for PES users. For this latter item, PES users were more than four times as likely to report use without a prescription than PES non-users (24.6% versus 5.3%, respectively).

#### 4. Discussion

College athletes contend with significant stressors beyond those of a typical college student. As a result, this population is often considered to have elevated risk for problematic substance use behaviors in terms of alcohol and other social/recreational drugs, which are prevalent in college environments, and performance enhancing substances, which continue to be a major concern at all levels of athletics. The present study adds to the limited current literature (McCabe et al., 2007; Buckman et al., 2009) by using a large, nationally-representative sample of male NCAA athletes to compare substance use behaviors of male college athletes who reported using PES during college to those who did not. Consistent with our hypothesis and previous investigations (Buckman et al., 2009), male college athletes reporting PES use in college were more likely to use all classes of drugs examined. Notably, PES-using male athletes were more likely than non-users to report using substances that improve athletic performance as well as psychoactive drugs for which the link to athletic performance is more tenuous (or non-existent).

Alcohol, cigarettes, marijuana, and cocaine are typically considered to have no real or perceived health or performance benefits. Nonetheless, male athletes who reported using PES during college reported drinking larger quantities of alcohol and binge drinking more often than non-PES using athletes. PES users were more likely to report recent use of cigarettes, marijuana, and cocaine. These findings support the hypothesis that male college athletes who use PES are at greater risk for using social/recreational drugs despite both personal and anecdotal evidence documenting the negative effects on athletic performance.

Male college athletes who engaged in PES use during college were more likely to report using dietary and other supplements, as well as other drugs that are touted but not necessarily proven to enhance performance, including amino acids, creatine, spit tobacco, amphetamines, narcotics, and asthma medications. Supplement use is often discouraged by the NCAA and university athletic programs because of concerns of poor regulation and contamination with banned or impermissible agents; it is not, however, typically banned. Tobacco products are not regulated and amphetamines, narcotics, and asthma medications all have certain exemptions to allow use. For every substance queried, those athletes classified as PES users based on their use of “ergogenic aids during college” reported higher prevalence rates.

A potentially important observation from this study was that self-reported drug use may vary depending on whether specific drugs versus general drug categories are referenced in the survey item. For example, the *number* of male student athletes who reported past year use of “narcotics” was substantially lower ( $n = 332$ ) than the number of student athletes responded to a “pain management medications” item by specifically noting use of Vicodin, Oxycontin, and Percocet ( $n = 1868$ ). Although there are many non-narcotic pain management medications available, individuals who responded that they had used “other pain management medications” were not included in this number. Thus, one possible explanation for the reporting discrepancy is that college athletes do not fully understand the “narcotic” drug classifications (i.e., know that Vicodin, Oxycontin, and Percocet are narcotics). A similar pattern was noted when athletes were asked about “amphetamine” use versus “ADHD medications”. Past year “amphetamine” use was reported by 381 individuals; past year use of “Ritalin or Adderall” was reported by 1311. Ritalin is a non-amphetamine-based stimulant and thus may be responsible for the discrepancy in reported frequencies, but this

would imply that almost 80% of past year Ritalin or Adderall users had used Ritalin. While possible, prior studies have suggested that Adderall use is more prevalent among college students (Sepulveda et al., 2011; Teter et al., 2006). Alternatively, it may be that college athletes do not fully understand which drugs (e.g., Adderall) are amphetamine-based products.

It is possible that the questionnaire items that name specific drugs garnered higher endorsement of use because these items are more comprehensible to college athletes. This is an important possibility as it implies the need for greater athlete education about drug classifications. From this, it may be conjectured that athlete knowledge of a drug's physiological actions, side effects, abuse profiles, and the potential for serious drug–drug interactions may likewise be limited. It also suggests that questionnaire developers should be more specific in framing substance use questions to enhance interpretability of responses. Alternatively, it may be that athletes are more likely to underreport use habits when asked about broader drug categories (rather than specific drugs) due to greater fears about possible repercussions and consequences from admitting use.

Currently, there are large gaps in scientific knowledge about the physiological and pharmacological profiles of performance enhancing substances. Thus, it is not surprising that college athletes must rely on insufficient, inaccurate, or anecdotal information to guide substance use decisions. The National Center for Drug Free Sport's Drug Resource Exchange Center is attempting to combat this problem, but without substantial and continued research effort, it is unclear how this problem can be fully resolved. Information is needed about how performance enhancing substances interact with each other and with other psychoactive drugs, as well as about the profile of short and long-term impact of these substances on health and performance. An important future research direction is to improve understanding and dissemination of information about drug interactions and about the possibility of compounding risk for cardiovascular and neurological side effects as the result of polydrug use.

We acknowledge that this study is limited by the use of retrospective self-report data and collection of highly sensitive information, which may increase the potential for underreporting. We further acknowledge that the data are cross-sectional and thus cannot address causality. The large number of statistical analyses performed possibly inflated Type I errors; however, this was partially mitigated by the use of a more conservative alpha ( $p < .001$ ). This study was performed using data from male NCAA athletes only; thus, risk profiles of female athletes may differ. The present findings, coupled with prior studies, aid in identifying a consistent pattern of greater drug use among male college athletes who report using ergogenic aids while in college compared to those who reported no use of ergogenic aids. The present study further contributes to existing literature by raising concerns about a potential lack of drug knowledge among college athletes. Well-researched, accurate information about both the potential benefits and drawbacks of engaging in performance enhancing and social-recreational drug use that can be used to bolster existing prevention and intervention programs is needed. Without better drug education available to athletes and stronger prevention messages, substance use behaviors among college athletes, particularly among those who engage in performance enhancing substance use, is likely to remain high.

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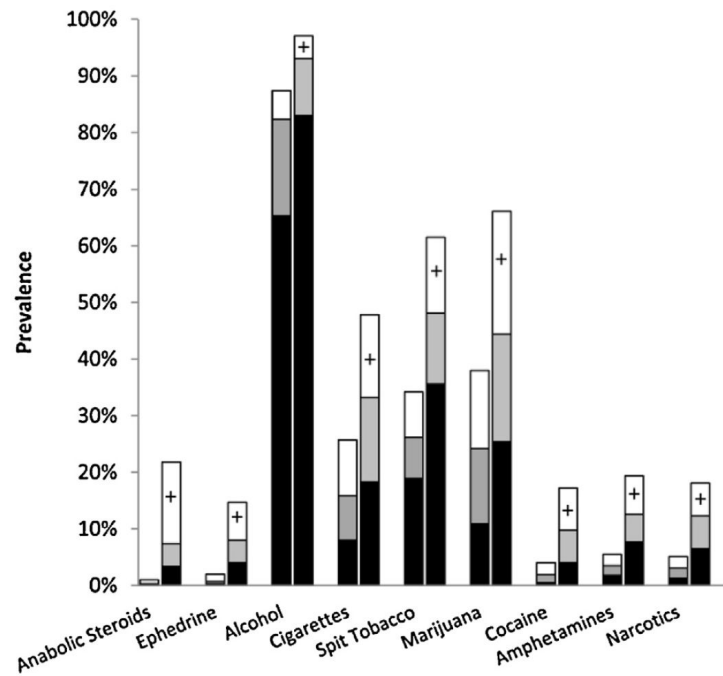
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**Fig. 1.** Prevalence of past month, past year, and lifetime alcohol and other drug use among performance enhancing substance (PES) users and non-users. Male NCAA athletes who reported using PES during college are represented with bars marked with “+”. Stacked bars depict use in the past 30 days (black), past 12 months (gray), and lifetime, but not in the past 12 months (white). Results indicated that PES-using athletes were consistently more likely to report substance use than NCAA athletes who did not report PES use during college.

**Table 1**

The use of dietary and other supplements during college in performance enhancing substance (PES) users and non-users

|                            | PES non-user | PES user | Chi square value |
|----------------------------|--------------|----------|------------------|
| Amino acids                | 34.1%        | 57.3%    | 64.56*           |
| Chromium                   | 2.1%         | 12.6%    | 109.87*          |
| Creatine                   | 52.3%        | 74.5%    | 54.39*           |
| Glucosamine                | 19.2%        | 36.5%    | 51.09*           |
| Multivitamin with caffeine | 11.4%        | 29.6%    | 83.34*           |
| Diuretics                  | 1.9%         | 11.9%    | 126.13*          |
| Energy boosters            | 22.8%        | 56.3%    | 178.62*          |
| Weight loss                | 7.6%         | 28.3%    | 162.17*          |
| Protein products           | 76.0%        | 79.5%    | 2.00             |
| Weight gain                | 26.0%        | 49.7%    | 82.24*           |
| Sleep aid (e.g., Ambien)   | 10.8%        | 21.8%    | 35.02*           |

\*  $df = 1, p < .001$ .