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Alcohol, Tobacco, Illicit Drugs, and Performance Enhancers: A Comparison of Use by College Student Athletes and Nonathletes

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Abstract

Objective—The authors compared the prevalence and pattern of substance use in undergraduate student athletes and nonathletes from 2005–2006.

Participants—Authors collected data from male ($n = 418$) and female ($n = 475$) student athletes and nonathletes from 2005–2006.

Methods—The authors administered self-report questionnaires to assess prevalence, quantity, and frequency of alcohol and drug use, and to determine patterns of student athletes' alcohol and drug use during their athletic season versus out of season.

Results—Male student athletes were at high risk for heavy drinking and performance-enhancing drug use. Considerable in-season versus out-of-season substance use fluctuations were identified in male and female student athletes.

Conclusions—Additional, and possibly alternative, factors are involved in a student athlete's decision-making process regarding drug and alcohol use, which suggests that the development of prevention programs that are specifically designed to meet the unique needs of the college student athlete may be beneficial.

Keywords

alcohol; athletics; college students; other drugs; performance-enhancing drugs; sex

The use of alcohol and drugs by students is one of the most serious problems facing colleges today. Student athletes may be particularly at risk for substance use-related problems in the college setting due to their unique social environments, the increased physical demands of athletics, and the heightened stress and time constraints placed upon them by fulfilling the dual role of athlete and student.^{1,2} Therefore, the college experience of student athletes may be distinct from nonathletes,² which raises the question of whether substance use interventions geared toward the general student body are equally effective for college student athletes.¹ In this study, we assessed the prevalence, quantity, and frequency of alcohol and drug use by male and female undergraduate student athletes and nonathletes. We also evaluated patterns of use, such as student athletes' alcohol and drug use during their athletic season versus out of season. Comprehensively assessing the prevalence and patterns of substance use in male and female student athletes and how it differs from nonathletes of the same sex may inform the development of prevention interventions that focus on the specific needs of student athletes.

In the United States, the rates of heavy drinking, tobacco use, and illicit substance use peak between ages 18 and 25 years.³ This age range coincides with a period of major transition out of high school and, for many, into college. In the college setting, frequent and heavy drinking is common. Using data collected from 5 national surveys, O'Malley and Johnston⁴ estimated that more than two-thirds of college students consumed alcohol in the last 30 days, and almost 70% of drinkers reported a heavy drinking episode (defined as 5 or more drinks on one occasion for men and 4 or 5 or more drinks for women, depending on the survey) in the prior 2 weeks. In addition, in the past 30 days approximately 19.5% of college students reported marijuana use, and 8.2% reported the use of an illicit substance other than marijuana.⁵ These prevalence rates, especially for alcohol, have essentially remained steady over the past 2 decades,^{6,7} which suggests that development and utilization of effective prevention and early intervention programs should remain a priority for universities.

Although research comparing the prevalence of alcohol use behaviors of college student athletes to nonathletes has yielded conflicting results,¹ rates of use in both samples are high, and binge drinking is consistently reported as being higher in student athletes versus their nonathlete peers.⁸⁻¹¹ Direct comparisons of student athlete to nonathlete drug use are rare; however, one report found that male student athletes are more likely to have used smokeless tobacco during the prior 30 days, but less likely to have smoked cigarettes.¹¹ Student athletes are also less likely to have used marijuana in the prior 30 days compared with nonathletes.^{11,12} Smokeless tobacco and marijuana use are typically reported by a significant minority of student athletes; in 2006, approximately 16.3% of student athletes reported using smokeless tobacco and 20.3% reported smoking marijuana in the previous 12 months.¹³ The use of other social drugs, such as cocaine, crack, and psychedelics, by college athletes is routinely observed, but prevalence rates remain low.^{13,14} These data indicate that a large percentage of student athletes engage in some type of high-risk substance use behavior, despite the potential for health- and performance-related negative consequences.

Of further concern for universities and athletic departments is the increasing exposure to, interest in, and availability of performance-enhancing drugs. Although anabolic steroid use by college athletes may be declining,¹³ the list of NCAA banned substances continues to expand and now includes more anabolic agents, peptide hormones and analogues, and releasing factors.¹⁵ Athletes use ephedrine and amphetamines to boost metabolism and endurance,¹⁶ nutritional supplements and weight loss products to control weight and improve health,¹⁷ and prescription painkillers (used with or without a valid prescription) to mask injury.¹⁸ Although the literature on performance-enhancing drug use in college athletics is relatively sparse, past year use of ephedrine appears to have declined since becoming banned, whereas past year amphetamine use appears to be increasing.¹³ The use of nutritional supplements is common,¹⁷ and the use of painkillers is evident in a sizeable subset of student athletes.^{18,19} Thus, the use of performance-enhancing drugs remains a significant problem in the college setting as student athletes continue to view these ergogenic compounds as beneficial, even though the performance benefits and health risks are still only poorly understood.²⁰

Last, college men consistently report significantly higher rates of heavy drinking when compared with college women.⁴ A similar trend has emerged with research indicating that male student athletes are more likely than female student athletes to drink heavily and frequently.^{9,11,21,22} However, beyond alcohol use there are very few data to inform us about differences in substance use behaviors that may exist between male and female student athletes. Male student athletes compared with female student athletes appear to be more likely to use smokeless tobacco¹¹ and performance-enhancing drugs, including nutritional supplements and anabolic steroids.²³ Marijuana use, on the other hand, has been reported to be equivalent among male and female student athletes,^{11,12,19} but may be greater in the off-season in male, compared

with female, student athletes.²¹ These data need to be updated and replicated to inform the development of prevention programming.

Taken together, there is compelling evidence that student athletes engage in potentially risky alcohol and drug use, yet many questions related to the prevalence and pattern of substance use in male and female student athlete samples remain unanswered. We designed this study to directly compare the substance use behaviors of sex-matched varsity student athletes and nonathletes. We sought to replicate prior studies identifying differences in alcohol use behaviors among student athletes and nonathletes and to expand on differences in substance use profiles between athlete and nonathlete samples by comparing the prevalence and pattern of a variety of social and performance-enhancing drug use. In line with prior studies, we hypothesized that female and male college student athletes and their nonathlete peers would demonstrate similarly high levels of alcohol use, but that heavy and risky alcohol use would be more evident in the student athlete samples. In addition, prior studies supported hypotheses that male student athletes would exhibit a greater preference for smokeless tobacco, but a lower preference for cigarettes, compared with nonathletes. Although there is only limited research to inform hypotheses involving social and performance-enhancing drug preferences and use patterns of student athletes, we tentatively hypothesized that student athletes, particularly males, would demonstrate a preference for performance-enhancing, but not social, drugs over nonathletes and that their use would exhibit a cyclical pattern (eg, in versus out of season) that differed significantly from nonathletes. A more complete understanding of drug use patterns and preferences of college student athletes can be valuable in determining the most effective approach to prevention programming for collegiate athletics programs.

METHODS

Participants

We recruited male and female students from a large northeastern university during 2005 and 2006. There were no inclusion or exclusion criteria except for being between the ages of 18 and 26 years. The athlete sample included 392 varsity student athletes from 17 athletic teams (including NCAA Tier 1 and Tier 2 sports) who were recruited during their participation in a mandatory alcohol education seminar. Note that all teams were subject to random drug testing for all university-banned substances during the academic year or while resident on-campus. No athletes refused to participate in the research, although completion of the survey was voluntary. The student sample included 504 students who were recruited from introductory psychology ($n = 70$) or communication ($n = 452$) classes. Eighteen student participants were eliminated from the analyses for being older than 26 years of age or for reporting that they were student athletes. For the present analyses, separate data sets were created for females ($n = 475$) and males ($n = 418$). Demographic features of each dataset, presented in Table 1, show significant within-sex differences in race, Greek membership, and living situation between student athletes and nonathletes.

Procedure

With the support and assistance of the university athletic department, we invited student athletes to participate in a voluntary research study that occurred immediately prior to a mandatory alcohol education seminar. A trained research assistant explained the nature of the research and reviewed an information form with potential student athlete participants. Participation was determined by verbal assent. The survey was completed in student athlete only groups, and team coaches were not present during data collection. Completion of the survey took approximately 30 minutes and was followed by a 45-minute alcohol education program.

The procedure for administering the survey to nonathletes was similar except that on the first page of the survey, participants were specifically asked if they were currently a university varsity athlete to prevent potential duplicate surveys from student athletes. If a student participant answered “yes” to this question, they were excused (with research credit) from further participation. Verbal assent was given by participants prior to survey completion, which took approximately 30 minutes. This study was approved by the university Institutional Review Board.

Measures

Demographic Variables—Participants provided information about their age, GPA, sex, and ethnicity (Asian/Pacific Islander, Black, Hispanic/Latino, White/Caucasian, and other/multiethnic). They were queried about their school standing (first-year student versus upper-class status), student status (full-time versus part-time), employment (not working versus part- or full-time work), SAT scores (< 1100 versus \geq 1100), membership in a fraternity or sorority (nonmembership versus membership), and living situation (fraternity or sorority house, off-campus residence, on-campus residence, or with parents).

Substance Use Variables—Self-report questions were adapted from the Rutgers Health and Human Development Project²⁴ and the Harvard School of Public Health College Alcohol Study.²⁵ Questions included frequency and quantity of alcohol use and frequency of heavy episodic drinking (defined as \geq 5 for men or \geq 4 for women drinks per sitting), during the past year, past 2 weeks, average week, and last year of high school. Lifetime, past year, high school, athletic season and off-season (student athletes only), semester (nonathletes only) and summer use of tobacco (cigarettes or smokeless tobacco), marijuana, cocaine or crack, hallucinogens (eg, LSD, mushrooms, mescaline), designer drugs (eg, Ecstasy, GHB, ketamine), methamphetamines (eg, speed, meth, uppers, nonprescription use of Ritalin/Adderall), ephedrine (for purposes other than weight loss), nonmedical prescription drug use (eg, Percocet, Xanax, Oxycontin), university-banned substances (including NCAA-banned and nonpermissible drugs; eg, steroids, creatine, Andro), weight-loss drugs (eg, Xadrine, TrimSpa, Stacker 2), and nutritional supplements (eg, whey protein, amino acid, weight gainer) were gathered.

Analyses—Male student athletes were compared only with male nonathletes, and female student athletes were compared only with their female nonathlete peers. Statistical comparisons were made using chi square, ANOVA, and *t*-test analyses.

RESULTS

Alcohol and Drug Use in Male Student Athletes and Nonathletes

Male student athletes and male nonathletes demonstrated significant differences in heavy drinking behaviors (see Table 2). Male student athletes reported a significantly higher average number of heavy drinking episodes over the past year and during high school compared with male students. In addition, although male student athletes and nonathletes did not differ in the average number of heavy drinking episodes reported during the prior 2 weeks, significantly more male student athletes reported at least one heavy drinking episode during that period than their nonathlete counterparts. Male student athletes also reported drinking significantly more drinks on their heaviest day in the last year compared with nonathletes. The pattern of weekly drinking further informs the nature of student athlete heavy episodic drinking; male student athletes reported significantly more drinks per day only on Saturday, and male nonathletes reported significantly more drinks per day on Thursday, Friday, and Sunday (see Table 2). Although not assessed statistically, the prevalence and frequency of heavy episodic drinking

appear to be substantially lower during high school as compared with the past year for student athletes and nonathletes.

Male student athletes were significantly more likely to report lifetime and past year use of banned performance-enhancing drugs; lifetime, high school, and past year use of nutritional supplements; and past year use of smokeless tobacco when compared with male nonathletes. Conversely, male nonathletes were significantly more likely to report lifetime use of cigarettes, hallucinogens, designer drugs, and other drugs; high school and past year use of designer drugs; and past year use of marijuana compared with male student athletes (see Table 3). Taken together, the prevalence of social drug use (ie, the use of marijuana, cocaine, hallucinogens, or designer drugs) was lower in male student athletes compared with nonathletes, but the prevalence of performance-enhancing drug use (ie, the use of ephedrine, prescription drugs, banned performance-enhancers, nutritional supplements, or methamphetamine) was higher (see Table 3). Interestingly, in male student athletes and nonathletes, the prevalence of cocaine and methamphetamine use in the past year was dramatically higher than that reported in high school.

In an attempt to better characterize patterns of substance use, student athlete substance use during the athletic season was compared with off-season use. Male student athletes were significantly less likely to report cigarette, smokeless tobacco, marijuana, cocaine or crack, hallucinogens, methamphetamines, and prescription drug (without prescription) use during their athletic season compared with off-season use (see Table 4). In fact, the prevalence of off-season social drug use, in general, was double that of in-season. However, although the prevalence of off-season performance-enhancing drug use was significantly higher than in-season use, in general, the rate of use remained high throughout the year.

Student athlete drug use, in- and off-season, was also compared with nonathlete semester use. Male student athletes were significantly less likely to report in- or off-season use of cigarettes and marijuana compared with nonathlete semester use (see Table 4). The prevalence of in-season hallucinogen and designer drug use was also lower than nonathlete semester use. Conversely, student athletes were significantly more likely to use smokeless tobacco, performance-enhancing drugs, and nutritional supplements in and out of the athletic season and methamphetamines during the off-season, compared with the nonathletes during the last semester. Finally, nonathlete use of hallucinogens and nutritional supplements was more prevalent during the summer than during the school semester, whereas the opposite was true for the use of methamphetamines (see Table 4).

Alcohol and Drug Use in Female Student Athletes and Nonathlete Students

Significant differences in the drinking behaviors of female student athletes and nonathletes were markedly different than between male athletes and nonathletes. Female student athletes reported consuming alcohol significantly less frequently over the past month when compared with female nonathletes (Table 2). In addition, the former reported significantly fewer total drinks and average drinks per week compared with the latter. Female student athletes reported consuming significantly more drinks on Tuesday, whereas female non-athletes reported drinking significantly more on Wednesday, Thursday, and Friday. Female nonathletes also reported a significantly higher average number of heavy drinking episodes during the past 2 weeks and during high school compared with female student athletes. In both samples, variables measuring heavy episodic drinking during the past year appear higher than those during high school.

Female nonathletes were significantly more likely to report lifetime, high school, and last year use of weight-loss products, lifetime use of cigarettes and designer drugs, high school use of prescription drugs, and past year use of marijuana when compared with female student athletes

(see Table 3). Female student athletes, on the other hand, were significantly more likely to report lifetime and high school use of banned performance-enhancing drugs and nutritional supplements when compared with female nonathletes. More generally, female student athletes reported a lower prevalence of social drug use, but not performance-enhancing drug use, compared with nonathlete students (see Table 3). Again, prevalence of cocaine and methamphetamine use over the past year was substantially higher than during high school, and this qualitative observation is particularly noticeable in the female student athlete sample.

Comparison of use across athletic season and between athletes and nonathletes revealed that female student athletes were significantly less likely to report use of cocaine or crack, hallucinogens, prescription drugs without a prescription, and weight-loss products in-season versus off-season (see Table 4). Alarming, the rate of social drug use quadrupled in female student athletes during their off-season. They reported significantly less in-season use of weight-loss products compared with female nonathletes in-semester use. In addition, female student athletes reported significantly more off-season use of hallucinogens compared with female nonathletes' in-semester use.

COMMENT

Over a decade has passed since the NCAA required athletic departments to provide substance abuse prevention programming to student athletes; however, research suggests that a high rate of substance use persists among the student athlete population. In agreement with prior research, male student athletes report significantly more occasions of heavy episodic drinking and a greater number of drinks on their heaviest drinking day versus male nonathletes. Our study adds to this finding by revealing that Saturday was the only day of the week in which male student athletes reported consuming more alcohol than their nonathlete peers. This implies that, whereas male college athletes tend to report similar weekly alcohol consumption as their male nonathlete peers, the bulk of their drinking occurs in a single day. Thus, when male student athletes find the opportunity to drink (which may be more infrequently than nonathletes due to their busy practice and school schedules), they tend to maximize it by engaging in heavy drinking. These results replicate data suggesting that male student athletes are in particular need of alcohol prevention programming.²⁶

As expected, male student athletes were significantly more likely to use smokeless tobacco, whereas male and female nonathlete students were more likely to report cigarette use than same-sex student athletes. Also replicating prior studies,^{11,12,19} the prevalence of marijuana use was lower in male and female student athletes than nonathletes. Taken together, it appears that the negative physiological effects of smoking in general, rather than the use of tobacco or marijuana specifically, factor into a student athlete's decision to use these substances. An examination of motivations and reasons for use, however, is needed before firm conclusions can be reached. Nonetheless, male and female student athletes report relatively high prevalence rates of marijuana use, and male student athletes are more likely to report cigarette, smokeless tobacco, and marijuana use during the off-season than in-season. These prevalence rates necessitate continued attention to tobacco and marijuana use when designing prevention programs, and suggest that the negative health consequences of smokeless tobacco use warrant particular attention in the design of athlete-specific drug prevention programs.

In terms of reported prevalence rates of other social drug use examined in this study, student athletes and nonathletes were more similar than dissimilar. Nonetheless, in general, there was significantly greater off-season social drug use than in-season use in male and female student athletes. It may be that student athletes are more aware of, or more affected by, the potential health, performance, and personal consequences of using social drugs in relation to the particularities of competitive athletics, and once the immediate consequences of the athletic

season pass, so do the reasons for choosing not to use these types of psychoactive drugs. Future research aimed at better understanding the factors associated with this fluctuation in social drug use among student athletes is needed to obtain a more consistent decrease in social drug use among student athletes.

Concerning the use of performance-enhancing drugs, we tentatively predicted that student athletes (men and women) would report significantly more use when compared with students. A higher prevalence of lifetime over-the-counter nutritional supplement and university-banned performance-enhancing drug use in male and female student athletes (versus same-gender nonathletes) provides partial support for this hypothesis. However, only male student athletes (versus male nonathletes) reported a higher prevalence of performance-enhancing drugs over the past year. This sex difference may be related to a social atmosphere in male college athletics that is more accepting of performance-enhancing drug use²³ and warrants further research. Although only minor differences in methamphetamine and prescription drug use were noted between athlete and nonathlete students, use of these substances was greater during the off-season as opposed to the athletic season for male student athletes. Moreover, other than marijuana and nutritional supplements, these drugs were the most prevalently used substances by male and female student athletes. Clearly, with over 55% of male student athletes reporting use of performance-enhancing drugs in the past year (and upwards of 48% reporting in-season use), the value of perceived physical benefits continues to outweigh the potential consequences of using these substances. Although current prevention programs and mandatory university and NCAA drug testing of student athletes may attempt to dissuade use, pressures to use by teammates, or acceptance of use by the larger athletic or university community, may create ambiguous messages for student athletes. This class of drugs, therefore, should continue to garner particular attention when developing athlete-specific prevention interventions.

Throughout our results, noticeable differences emerged when comparing student athlete substance use in- and out-of-season and over time (such as from high school to college). Drug testing cannot account for these in-season and off-season differences because all athletes were subject to testing throughout the academic year. Nonetheless, male student athletes reported a greater prevalence of social and performance-enhancing drug use during the off-season as opposed to in-season. This pattern was more consistently observed in the rates of social drug use, with cigarette, smokeless tobacco, marijuana, cocaine or crack and hallucinogen use reported as lower during the athletic season. Conversely, among performance-enhancing drugs, only methamphetamine and prescription drug use declined in season. Female student athletes also reported greater social, but not performance-enhancing, drug use during the off-season. Their rates of social drug use rose dramatically out-of-season, potentially identifying an important shortfall in current prevention programming for female college student athletes. Furthermore, male and female student athletes' use of cocaine or crack, methamphetamines, and prescription drugs substantially increased from high school to college. These results reveal the importance of fully characterizing a student athlete's historical and current substance use pattern and expand the current understanding of substance use patterns in college student athletes.

Although we did not compare substance use prevalence rates and patterns between males and females, qualitative differences in male and female student athlete substance use profiles were noted. In this sample, the drinking behaviors of female student athletes appeared more moderate compared with their female nonathlete peers, as did their use of all social drugs. However, the quadrupling of social drug use during the off-season indicates that female student athletes also engage in potentially risky patterns of substance use and may be more dissuaded than males by fears about drug effects on athletic performance. Although female student athletes compared with nonathletes reported a significantly higher prevalence of life-time and high school banned performance-enhancing and nutritional supplement use, these higher prevalence rates were

substantially lower than among male student athletes, and, furthermore, were not observed over the past year. Taken together, these data offer initial evidence that the social environment of female athletics is distinct from that of male athletics, and that, although sport involvement appears to serve a protective function for women, female student athletes would benefit from more tailored prevention programs.

Limitations

In general, the present study contributes to the literature on student athlete substance use by identifying distinct patterns of alcohol and drug use by student athletes, with male athletes appearing to be at higher risk for heavy drinking patterns and performance-enhancing drug use compared with their nonathlete peers. However, this study was limited by the same conceptual and methodological concerns that apply to most survey data, including those associated with self-report, the use of retrospective report, and the type of information requested (highly sensitive and with potentially significant negative consequences, particularly for student athletes). Although data were collected from 17 teams, drug use differences were not assessed across different athletic teams due to IRB concerns. Although use of a broad spectrum of social and performance-enhancing drugs was assessed in the present study, the list of drugs tested in this study is not exhaustive. The generalizability of the present study may be limited by the use of a convenience sample (due to the recruitment strategies, which relied directly on coaches making their players available) and the fact that these samples were drawn exclusively from a major northeastern NCAA Division I school. In addition, several important demographic variables significantly differed between the student athlete and nonathlete samples; however, a better sampling procedure is not likely to correct for these differences, given that student athletes tend to be predominantly white and remain in campus housing,¹³ in contrast to their nonathlete peers at many major universities. Because of the large proportion of white athletes and power concerns, we could not analyze the data separately by race or ethnicity. However, assessment of racial or ethnic drug use differences among student athletes remains an important area for future research.

It should also be noted that illicit use of Ritalin and Adderall was included in the current methamphetamine category, potentially increasing the prevalence rates for student athletes and nonathlete use of methamphetamine. Similarly, the definition of banned substances went beyond steroids, the drugs most traditionally considered, and included any substance banned or nonpermissible by the NCAA (such as creatine). Therefore, our categories of drugs may have blurred important distinctions among types of performance-enhancing drugs, which should be examined in future research. Furthermore, to our knowledge, this study is the first to highlight the use of prescription drug use specifically without a medical prescription in a student athlete population. These drug categories were created to more accurately capture the performance-enhancing substance use behaviors of student athletes; however, the use of Ritalin and Adderall for academic and recreational purposes has also been reported,²⁶ and nonprescription use of pain medication may include use for legitimate, undiagnosed pain relief and getting high.²⁷ Nonetheless, with the ever-changing landscape of drug availability and popularity, continually updating the list of drugs included in the assessment, while also properly categorizing them, is essential to accurately identify and target high-risk substance use behaviors in a prevention program.

Implications for Prevention

The general college student body has historically been the targeted population in prevention research, and although some special college groups (such as fraternity and sorority members) have been singled out, student athletes have been neglected despite their at-risk substance use profile.²⁶ Recent literature on effective college student prevention strategies suggest that brief interventions with personalized feedback have consistently positive results across multiple

samples.^{28–31} Although these strategies have yet to be empirically tested on student athlete samples, the present findings do not contraindicate the use of brief intervention methods for this high-risk college group. Nonetheless, the present study does highlight the need to include substances beyond alcohol, such as smokeless tobacco, marijuana, cocaine, hallucinogens, and performance-enhancing drugs in brief interventions for student athletes, and suggest that feedback tailored specifically to in- and off-season substance use may be of critical importance. The present study serves as a first step in the development of a comprehensive substance abuse prevention program targeting college student athletes. Future studies are needed to examine possible differences between student athletes and nonathletes in risk factors associated with substance abuse (eg, family history, motivation for use, sensation seeking, consequences of use, and/or peer normative perceptions). Assessment of prevalence rates, patterns of use, and risk factors for and consequences from substance use in student athletes can be harnessed by clinicians to inform the development of future prevention and brief interventions programs for this particularly at-risk college population.

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TABLE 1

Demographic Characteristics of Student Athletes and Nonathletes

| Characteristic | Male students (n = 185) | | Male athletes (n = 233) | | Female students (n = 317) | | Female athletes (n = 158) | |
|-----------------------------------|-------------------------|-----|-------------------------|-----|---------------------------|-------|---------------------------|-----|
| | M | SD | M | SD | M | SD | M | SD |
| Age (y) | 20.2 | 1.6 | 20.1 | 1.4 | 19.9 | 1.3** | 19.6 | 1.2 |
| Ethnic background (%) | | | | | | | | |
| Asian/Pacific Islander | 20.4*** | | 2.6 | | 16.4*** | | 3.2 | |
| Black | 6.1 | | 7.0 | | 8.0 | | 12.3 | |
| Hispanic/Latino | 3.3 | | 0.9 | | 9.3** | | 1.9 | |
| White/Caucasian | 60.2*** | | 84.4 | | 57.2*** | | 77.4 | |
| Other/Multiethnic | 9.9 | | 5.2 | | 9.0 | | 5.2 | |
| First-year class standing (%) | 17.8 | | 24.6 | | 5.7*** | | 30.6 | |
| Full-time student status (%) | 97.8 | | 98.7 | | 99.0 | | 99.4 | |
| Employed full- or part-time (%) | 58.2*** | | 22.9 | | 70.7*** | | 29.0 | |
| GPA | 2.9 | 0.5 | 2.9 | 0.5 | 3.1 | 0.5* | 3.0 | 0.6 |
| SAT score \geq 1100 (%) | 73.6 | | 68.9 | | 60.4 | | 57.0 | |
| Fraternity or sorority member (%) | 7.8* | | 3.0 | | 15.3*** | | 1.9 | |
| Living status (%) | | | | | | | | |
| Frat or sorority house | 3.3* | | 0.4 | | 0.3 | | — | |
| Off-campus housing | 37.2*** | | 59.7 | | 28.8** | | 42.0 | |
| Residence hall or dorm room | 43.9 | | 38.5 | | 58.0 | | 56.0 | |
| With parents | 15.6*** | | 1.3 | | 14.9*** | | — | |

Note: Only within-sex comparisons were made between student athletes and nonathletes.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

TABLE 2

Alcohol Use, by Athlete Status

| Status | Male students | | Male athletes | | Female students | | Female athletes | |
|------------------------------------|---------------|---------|---------------|-------|-----------------|---------|-----------------|-------|
| | M | SD | M | SD | M | SD | M | SD |
| Abstinent (%) | 15.07 | 4.9 | 15.19 | 5.6 | 15.52 | 6.3 | 15.88 | 7.6 |
| Age of initial alcohol use | | 2.53 | | 2.26 | | 2.17 | | 2.07 |
| Drinkers (%) | | | | | | | | |
| Past year | 90.6 | | 93.6 | | 91.1 | | 91.1 | |
| Past month | 83.0 | | 85.4 | | 79.7 | | 76.6 | |
| Drinking frequency—last month | 2.25 | 1.47 | 2.10 | 1.25 | 1.96 | 1.37*** | 1.53 | 1.17 |
| Drinking frequency—past year | 3.03 | 1.58 | 3.09 | 1.37 | 2.81 | 1.51 | 2.55 | 1.46 |
| Heavy episodic drinkers (%) | | | | | | | | |
| Past year | 83.5 | | 89.3 | | 77.9 | | 80.9 | |
| Past 2 weeks | 59.1** | | 71.4 | | 49.5 | | 45.5 | |
| During high school | 69.1 | | 74.0 | | 58.8 | | 54.6 | |
| Frequency of heavy drinking | | | | | | | | |
| Past year | 26.75 | 37.51** | 39.52 | 47.87 | 19.42 | 32.64 | 17.44 | 29.26 |
| Past 2 weeks | 2.13 | 2.66 | 2.14 | 2.29 | 1.52 | 2.20* | 1.08 | 1.79 |
| During high school | 14.07 | 22.79* | 20.57 | 32.39 | 10.94 | 21.39* | 6.47 | 13.14 |
| Heaviest drinking day—past year | 11.28 | 7.41* | 13.19 | 7.48 | 7.18 | 4.68 | 7.63 | 5.45 |
| Number of drinks in a typical week | | | | | | | | |
| Monday | 0.21 | 0.95 | 0.14 | 0.70 | 0.05 | 0.41 | — | — |
| Tuesday | 0.59 | 1.92 | 0.96 | 2.51 | 0.17 | 0.78* | 0.42 | 1.59 |
| Wednesday | 0.28 | 1.23 | 0.19 | 1.27 | 0.11 | 0.62* | — | — |
| Thursday | 2.92 | 4.10*** | 1.42 | 2.91 | 1.82 | 2.50*** | 0.79 | 2.21 |
| Friday | 4.48 | 4.35** | 3.08 | 4.46 | 2.66 | 2.69*** | 1.63 | 2.59 |
| Saturday | 4.22 | 4.70*** | 6.26 | 5.21 | 2.61 | 2.79 | 3.05 | 3.27 |
| Sunday | 0.42 | 1.51* | 0.14 | 0.72 | 0.12 | 0.64 | 0.07 | 0.81 |
| Weekly average | 1.89 | 1.99 | 1.73 | 1.63 | 1.08 | 1.10* | 0.85 | 1.11 |
| Total drinks per week | 13.15 | 13.89 | 12.14 | 11.40 | 7.54 | 7.73* | 5.97 | 7.77 |

Note. Only within-sex comparisons were made between student athletes and nonathletes.

$p < .05$.
**
 $p < .01$.

 $p < .001$.

TABLE 3

Prevalence of Lifetime, High School, and Past-Year Drug Use in Student Athletes Compared with Nonathletes

| Status | Male students | Male athletes | Female students | Female athletes |
|--|---------------|---------------|-----------------|-----------------|
| Lifetime use (%) | | | | |
| Cigarettes | 49.7* | 39.9 | 53.5*** | 35.4 |
| Smokeless tobacco | 16.9*** | 41.4 | 5.6 | 8.9 |
| Marijuana | 63.8 | 54.5 | 62.4 | 53.8 |
| Cocaine/crack | 15.5 | 12.5 | 7.4 | 3.8 |
| Hallucinogens | 23.3* | 15.5 | 9.7 | 9.6 |
| Designer drugs | 17.3*** | 6.1 | 10.9** | 3.8 |
| Methamphetamines | 21.0 | 28.8 | 16.6 | 16.6 |
| Ephedrine | 5.1 | 6.1 | 6.7 | 4.5 |
| Prescription drugs | 24.3 | 22.8 | 14.7 | 10.2 |
| Banned performance-enhancers | 7.8** | 17.8 | 0.3** | 3.2 |
| Weight-loss products | 19.0 | 12.1 | 25.9** | 12.7 |
| Nutritional supplements | 41.1** | 57.1 | 14.0* | 22.3 |
| Other drugs | 8.1** | 2.4 | 4.8 | 3.3 |
| High school use (%) | | | | |
| Cocaine/crack | 7.2 | 4.3 | 2.6 | 0.6 |
| Hallucinogens | 12.2 | 8.8 | 4.8 | 4.5 |
| Designer drugs | 12.2* | 5.2 | 6.4 | 3.2 |
| Methamphetamines | 8.9 | 11.4 | 5.5 | 3.2 |
| Ephedrine | 3.9 | 4.8 | 5.1 | 4.5 |
| Prescription drugs | 14.0 | 11.5 | 9.0* | 3.9 |
| Banned performance-enhancers | 6.2 | 11.0 | 0.3* | 2.6 |
| Weight-loss products | 10.2 | 9.6 | 17.9* | 8.9 |
| Nutritional supplements | 25.4*** | 42.3 | 9.0* | 15.4 |
| Last year use (%) | | | | |
| Smokeless tobacco | 6.1*** | 32.2 | 3.6 | 3.8 |
| Marijuana | 50.0** | 37.3 | 47.6*** | 25.0 |
| Cocaine/crack | 12.2 | 11.7 | 4.8 | 3.2 |
| Hallucinogens | 16.7 | 10.8 | 4.9 | 5.7 |
| Designer drugs | 8.3*** | 1.3 | 3.5 | 1.9 |
| Methamphetamines | 16.6 | 22.9 | 12.9 | 14.7 |
| Ephedrine | 2.2 | 2.2 | 3.2 | 1.3 |
| Prescription drugs | 21.7 | 17.0 | 9.6 | 7.1 |
| Banned performance-enhancers | 3.9* | 9.7 | 0.3 | — |
| Weight-loss products | 11.3 | 7.0 | 13.9** | 5.1 |
| Nutritional supplements | 29.9** | 45.7 | 10.5 | 15.3 |
| Social drugs ^a | 52.4** | 38.2 | 48.3*** | 25.3 |
| Performance-enhancing drugs ^b | 46.0* | 55.8 | 25.2 | 29.8 |

Note. Only within-gender comparisons were made between student athletes and nonathletes.

^a Social drugs included marijuana, cocaine/crack, hallucinogens, and designer drugs.

^b Performance-enhancing drugs included methamphetamines, ephedrine, university-banned substances, weight loss products, and nutritional supplements.

* p < .05.

** p < .01.

*** p < .001.

TABLE 4
 Comparisons of Drug Use by Male and Female Student Athletes During Athletic Season and Off-Season and Nonathletes During the School Semester and Summer

| Status | Student athletes | | | Nonathlete student | | Significant differences |
|------------------------------------|------------------|------------|----------|--------------------|--------|-------------------------|
| | In-season | Off-season | Semester | Semester | Summer | |
| Male (%) | | | | | | |
| Cigarettes | 6.9 | 9.9 | 27.6 | 26.1 | 26.1 | A*, B***, C*** |
| Smokeless tobacco | 25.7 | 29.7 | 4.4 | 4.4 | 5.0 | A*, B***, C*** |
| Marijuana | 11.2 | 28.5 | 44.8 | 45.9 | 45.9 | A***, B***, C*** |
| Cocaine/crack | 5.7 | 10.0 | 9.4 | 10.6 | 10.6 | A** |
| Hallucinogens | 4.4 | 9.1 | 10.0 | 14.4 | 14.4 | A*, B*, D* |
| Designer drugs | 0.4 | 1.7 | 5.0 | 6.7 | 6.7 | B** |
| Methamphetamines | 17.9 | 23.0 | 14.4 | 8.4 | 8.4 | A**, C*, D* |
| Ephedrine | 1.8 | 1.3 | 0.6 | 1.1 | 1.1 | |
| Prescription | 12.6 | 16.1 | 15.6 | 15.6 | 15.6 | A* |
| Banned drugs ^a | 7.1 | 9.3 | 2.2 | 2.8 | 2.8 | B*, C** |
| Weight-loss products | 6.1 | 6.5 | 7.3 | 7.9 | 7.9 | |
| Nutritional supplements | 41.7 | 43.6 | 23.0 | 28.2 | 28.2 | B***, C***, D* |
| Social drugs ^b | 15.5 | 30.9 | | | | A*** |
| Performance enhancers ^c | 48.5 | 53.6 | | | | A* |
| Female (%) | | | | | | |
| Cigarettes | 8.2 | 7.0 | 18.1 | 22.3 | 22.3 | B**, C**, D* |
| Smokeless tobacco | 3.2 | 3.2 | 1.6 | 2.3 | 2.3 | |
| Marijuana | 4.4 | 19.0 | 35.7 | 42.0 | 42.0 | A***, B***, C**, D** |
| Cocaine/crack | 1.3 | 3.8 | 3.5 | 2.9 | 2.9 | A*, C** |
| Hallucinogens | 0.6 | 6.4 | 1.6 | 3.6 | 3.6 | A**, D* |
| Designer drugs | — | 1.9 | 2.3 | 1.9 | 1.9 | |
| Methamphetamines | 9.6 | 12.8 | 9.7 | 5.5 | 5.5 | D** |
| Ephedrine | 1.3 | 2.6 | 1.0 | 2.3 | 2.3 | D* |
| Prescription | 2.6 | 6.5 | 6.7 | 7.1 | 7.1 | A* |
| Banned drugs ^a | 0.6 | — | 0.3 | 0.3 | 0.3 | |

| Status | Student athletes | | Nonathlete student | | Significant differences |
|------------------------------------|------------------|------------|--------------------|--------|-------------------------------------|
| | In-season | Off-season | Semester | Summer | |
| Weight-loss products | 1.3 | 6.4 | 8.5 | 10.4 | A ^{***} , B ^{***} |
| Nutritional supplements | 14.0 | 12.3 | 8.3 | 8.0 | |
| Social drugs ^b | 5.1 | 21.5 | | | A ^{***} |
| Performance enhancers ^c | 21.5 | 25.9 | | | |

Note. A = Comparisons of athletes in vs. out of season; B = Comparisons of athletes in athletic season to nonathletes during the school semester; C = Comparisons of athletes out of athletic season to nonathletes during the school semester; D = Comparisons of nonathletes during the school semester vs. during the summer.

^aRefers to university banned substances, including NCAA banned and nonpermissible performance enhancing drugs.

^bSocial drugs included marijuana, cocaine/crack, hallucinogens, and designer drugs.

^cPerformance-enhancing drugs included methamphetamines, ephedrine, banned substances, weight loss products, and nutritional supplements.

* $p < .05$.

** $p < .01$.

*** $p < .001$.