

Original article

Gambling and Health Risk Behaviors Among U.S. College Student-Athletes: Findings from a National Study

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Abstract

Purpose: To examine prevalence and associations of gambling problems and health risk behaviors among college athletes from the first national survey of gambling among U.S. college student-athletes.

Methods: Conducted by the National Collegiate Athletic Association (NCAA), this self-administered and anonymous survey collected information from a nationally representative sample of 20,739 student-athletes.

Results: Males consistently had higher past-year prevalence of gambling than females (e.g., 62.4% of males reported some type of gambling vs. 42.8% of females). Based on DSM-IV Gambling Screen, this study identified 4.3% of males and 0.4% of females as problem/pathological gamblers. A general upward trend existed that as the level of gambling problems increased, so did the prevalence of substance use, gorging/vomiting, and unprotected sex. Cross-group comparisons by gambler type were all significant. Problem and pathological gamblers also experienced significantly more drug/alcohol-related problems than non-gamblers and social gamblers.

Conclusions: Direct associations found between gambling and multiple risk behaviors in college student-athletes support the persistence of the youth problem-behavior syndrome and suggest the need for multi-faceted initiatives to tackle these risk behaviors simultaneously. © 2007 Society for Adolescent Medicine. All rights reserved.

Keywords:

Gambling; Health risk behaviors; Alcohol; Smoking; Drug use; Disordered eating; Unprotected sex; Prevalence; College student-athletes; Gender

Gambling in adolescents and young adults has increasingly become a significant public health issue, especially in the wake of the widespread expansion of legalized gambling throughout North America [1]. However, despite considerable consensus in the current literature that youth represent

the highest risk group for gambling problems, most studies have targeted adult gamblers, and relatively fewer studies have focused on or included young adult gamblers [2–7].

From existing prevalence studies over the past 25 years in the United States and Canada, Shaffer and Hall [6] employed a meta-analytic strategy to synthesize the prevalence estimates of disordered gambling in different population segments. They consistently reported adolescents and college students to be at significantly increased risk for gambling-related problems. For example, the lifetime prevalence estimates of level 2 (sub-clinical/problem) and level

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3 (pathological) gambling among adolescents are reported to be 8.4% and 3.4%, respectively, which is nearly double those found in adults (4.2% and 1.9%, respectively). College students yield even higher estimates (10.9% and 5.6%, respectively) than those found among adolescents. Surprisingly, as a high-risk group, college students have received the least amount of research attention, as evidenced by Shaffer and colleagues' synthesis of gambling research (i.e., of the 139 study samples identified, only 19 were from college students, compared with 32 adolescent and 66 adult population studies).

Even fewer studies have been conducted among college student-athletes, although emerging evidence suggested that gambling problems were more prevalent among students involved in college athletics. For example, a recent study using a small sample of college students revealed significantly greater problem gambling rates in athletes than non-athletes [8]. Specifically, the lifetime prevalence of problem and pathological gambling among male student-athletes was 26%, compared with 16% among male non-athletes. The same pattern was found among females, with female athletes (7%) exceeding non-athletes (4%) in the prevalence of gambling problems. It should be noted that these estimates were derived from a relatively small sample of students (207 athletes and 1076 non-athletes) attending a state university "in a pro-gambling culture," where multiple gambling sites including casinos were easily accessible.

There have been other prior attempts at quantifying gambling and wagering behavior among select groups of student-athletes. For example, the National Collegiate Athletic Association (NCAA) conducted a self-report study on infractions and found that 25.5% of Division I men's football and basketball players indicated that they had gambled money on other collegiate sporting events and 3.7% had wagered on a game in which they played [9]. Cross and Vollano [10] reported that over 45% of Division I men's basketball and football student-athletes gambled on sports while attending college, and that 4.1% of them had provided inside information to gamblers and 0.4% had accepted money for playing poorly in a game. Unfortunately, these prior studies of gambling behavior among student-athletes employed fairly small samples (less than 1000) and focused on limited numbers of institutions within Division I high-profile sports only (i.e., football and basketball).

What makes gambling problems even more problematic is that, as sparse as the existing literature on college student gambling, studies have repeatedly found problem and pathological gambling among college students to be associated with a host of other risk-taking problem behaviors, including alcohol abuse, illicit drug use, unsafe sex, and disordered eating [8,11–13]. Further, results of a college student survey indicated that student-athletes engaged in heavy episodic drinking more commonly than non-athletes [14]. A recent investigation among college athletes also suggested that female athletes in particular were at signifi-

cant risk for developing eating-related problem behaviors [15]. Of interest and unknown is whether gambling is also related to other health risk behaviors in the college student-athlete population.

To address the above questions and bridge the gap in the literature, student-athlete gambling and risk behaviors need to be assessed across a broader spectrum of the student-athlete population on a national level. The current study represents the first effort to collect information on gambling and risk behaviors from a nationally representative sample of student-athletes. It was groundbreaking in terms of scope and breadth (e.g., data were collected from students in all NCAA divisions and from most championship sports).

The aims of this study were four-fold. First, we wanted to assess the nature and extent of gambling among U.S. college student-athletes. To do this, we analyzed the types and prevalence of gambling activities engaged in by student-athletes. Additionally, to evaluate potential gender differences, males and females were also examined separately in all analyses throughout this study. Third, with the inclusion of the 10 DSM-IV Gambling Screen questions, we were able to estimate the national prevalence of problem and pathological gambling among student-athletes. Lastly, considering the common co-occurrence of problem behaviors in youth, the final aim of this study was to examine the associations between gambling and other health-threatening risk behaviors among student-athletes. Illumination of such relationships can help us better understand the risk of gambling in terms of its associated health risk behaviors, including drug/alcohol-related problems. This information can be instrumental in identifying high-risk student-athletes and guiding the development of prevention programs and future research.

Methods

The present study is based on survey data from the "2003 NCAA National Study on Collegiate Sports Wagering and Associated Health-Risk Behaviors." This self-administered, voluntary, and anonymous survey included 102 questions and is the most comprehensive and first truly national assessment of gambling behavior among U.S. college student-athletes ever undertaken.

Sampling

The sampling plan was designed so that at least 12% of the NCAA member institutions that sponsor a given sport would be asked to survey their student-athletes in that sport. Student-athletes in most NCAA championship sports were targeted for participation. This sampling strategy was expected to achieve an appropriate representation of the NCAA student-athlete population.

After the sampling plan was devised, a computer program that sampled institutions at random and selected one to three sports at each NCAA member institution for study was

implemented. To minimize institutional burden, no school was asked to collect responses from more than three of its athletics teams. Ultimately, students from 2003 individual sport teams at 1032 member institutions were asked to participate in the study. We estimated a response rate of between 65% and 75%, based on previous surveys conducted in this manner and the total number of surveys received.

Survey administration

The protocol for this study was approved by the institutional review board at NCAA, and accordingly, the survey was conducted in consultation with the Directors of Athletics at participating schools. Once institutions were identified and sports were selected for those schools, the Faculty Athletics Representative (FAR) at each NCAA member institution was contacted to help conduct the survey. The FAR was provided with a specific protocol to follow and script to read, which emphasized that the study was completely voluntary, each student's responses were anonymous, and voluntary completion of this study constituted the informed consent to participate, as reiterated on the survey form. The FAR distributed the survey to all adult student-athletes of a sampled team on the same occasion. The last member to complete the survey was asked to seal and send to NCAA the pre-addressed, prepaid envelope into which student-athletes deposited completed surveys.

Participants

A total of 20,739 valid, individual surveys were received. Males (approximately 62%) were slightly over-represented in the sample responses, compared with the full NCAA student-athlete population (58% males and 42% females). In regard to years of age, 88.8% of this college athlete sample was 18–21 years, 10.8% was 22 or older, and 0.4% was under 18. Among student-athletes reporting their race/ethnicity, 75% described themselves as white, 15% as African-American, and 10% as from another racial/ethnic group. These proportions approximate those seen in the overall U.S. population of student-athletes [16].

Analysis

SPSS was used to perform all data analyses in the study. To counteract the effect of under-representation of some sports and Division affiliation within the current sample, a series of weighting functions were employed as necessary to produce aggregate data that would more accurately reflect behavior within the overall student-athlete population. Also, the prevalence of gambling and risk behaviors among males and females was estimated separately to account for gender differences. Chi-square tests were used in gender comparisons where appropriate.

The DSM-IV [17] provides a list of 10 characteristics of a pathological gambler. Questions corresponding with the

10 diagnostic criteria were included in this survey; e.g., "During the past year, have you needed to gamble with larger amounts of money or with larger bets in order to obtain the same feeling of excitement?" and "After you lose money gambling, do you often return another day to try to win back your losses?" Responses to the 10 items were summed to create a DSM Gambling Screen score [18], ranging from 0 to 10, with a higher score indicating more gambling problems. The 10 DSM diagnostic criteria and the standard cut score of 5 for pathological gambling have been found to exhibit satisfactory reliability (e.g., Cronbach's alpha = .92), validity (e.g., construct, convergent, and discriminant), and classification accuracy (e.g., hit rate = .91, specificity = .98) [18]. Accordingly, respondents who reported participation in at least one of the 14 gambling activities surveyed in the questionnaire during the past year were classified as "social gamblers," "problem gamblers," and "pathological gamblers" if they had a DSM score of 0–2, 3–4, and 5 or more, respectively.

In contrast, respondents who indicated no participation in any of the 14 gambling activities and who had either a missing DSM score or a score of zero were classified as "non-gamblers." Note that respondents who did not engage in any gambling activities during the past 12 months were instructed to skip the DSM Gambling Screen questions and thus were missing on the DSM score variable.

Respondents who reported no gambling involvement but who had a DSM score of one or more, as well as those who participated in at least one of the 14 gambling activities but who had a missing DSM score, were both omitted from all analyses based on the DSM score but were retained for all other analyses. In total, data from 17,076 individuals were available for DSM score-related analyses.

The following seven health risk behaviors were assessed. Respondents' past-year use of cigarettes and alcohol was dichotomized into yes/no, respectively, as was their past-month heavy episodic drinking, phrased as having 5 or more drinks of alcohol at one sitting. Respondents' current use of marijuana and other drugs was also dichotomized into yes/no, respectively, as was their "binge eating" experience, defined in our survey as eating to the point of stuffing oneself and then vomiting. Respondents were also dichotomized into whether or not they ever had sexual intercourse without using a condom during the past year. The prevalence of each risk behavior was then compared across various types of gamblers, using Pearson χ^2 test, first with males and females combined and then separately. Also examined were χ^2 comparisons between males and females in the population prevalence of each risk behavior, independent of gambling severity.

Respondents were asked whether they had experienced any problems associated with drug and alcohol use during the past year. Listed were 18 consequences, including effects on health (e.g., hangover, memory loss, injury), safety (e.g., driving under the influence, arrested for DWI/DUI),

Table 1
Past-year prevalence of gambling activities engaged in by college student-athletes, by gender (sorted by “overall” prevalence)

Gambling activity	Percent		
	Male (n = 12,795)	Female (n = 7734)	Overall (n = 20,529)
Played cards or board games for money	45.3	18.9	35.2
Bought lottery tickets	35.7	28.5	33.0
Bet on games of personal skill	38.0	13.3	28.6
Engaged in some other type of gambling	24.4	7.4	17.9
Played slot or electronic poker machines	19.2	13.0	16.9
Bet on sports cards, football pools, or parlays	21.1	5.6	15.2
Played table games at a casino	18.5	7.6	14.3
Shot dice or played craps	13.0	3.4	9.3
Played the stock market	10.1	3.4	7.6
Bet on horse or dog races	9.5	4.6	7.6
Played commercial bingo	6.4	7.4	6.7
Wagered on the internet on casino or other games	6.4	2.1	4.7
Wagered on intercollegiate games with an off-campus bookie	3.9	0.7	2.7
Wagered on intercollegiate games with a campus bookie	2.7	0.5	1.8

Note: Sample size of each gambling activity varied due to item missing and 210 respondents not indicating their gender. χ^2 comparisons by gender were all significant at $p < .05$.

performance (e.g., did poorly on a test or in a game, missed a class or practice), relationships (e.g., got into an argument, was criticized by someone I know), and awareness of problems (e.g., thought I might have a drinking/drug problem, did something later regretted, tried unsuccessfully to stop using, sought professional assistance). Each of the 18 items was dichotomized into yes/no, scoring 1/0. These item scores were summated to indicate the number of drug/alcohol-related problems experienced by each respondent, ranging from 0 to 18. The mean number of problems for each type of gambler was computed and compared with one another, using ANOVA and Scheffe post hoc tests, first with males and females combined and then separately.

Results

The past-year prevalence of gambling and sports wagering was consistently higher among male student-athletes than among their female counterparts. In our sample of 20,739 student-athletes, more than three in five males (62.4%) and two in five females (42.8%) indicated participation in some type of gambling activity during the past 12 months. Almost 35% of males reported wagering on any sporting events (professional or collegiate) in the past year, compared with nearly 10% of females.

In regard to the types of gambling behavior engaged in by student-athletes during the past 12 months, among the most prevalent activities were: “Played cards or board games for money (with family or friends)” (35.2%); “Bought lottery tickets” (33.0%); “Bet on games of personal skill (like pool, golf, or bowling)” (28.6%); “Engaged in some other type of gambling” (17.9%); and “Played slot or electronic poker machines” (16.9%). These prevalence fig-

ures were derived from the entire student-athlete sample without regard to gender. When examined separately, males had much higher prevalence of participation than females across all gambling activities, except for playing commercial bingo (6.4% males vs. 7.4% females). Depending upon the form of gambling, the male-to-female prevalence ratio ranged from approximately 1.3 to 5.6. All χ^2 comparisons by gender were statistically significant at $p < .05$. Other popular gambling activities include “Bet on sports cards, football pools, or parlays” among males (21.1%) and “Played table games at a casino” among females (7.6%) (Table 1).

Based on the DSM-IV Gambling Screen methodology, 1.2% and 3.1% of males in our national student-athlete sample were classified as pathological and problem gamblers, respectively. In contrast, only 0.1% and 0.3% of females were classified as such (Table 2). The χ^2 compar-

Table 2
Past-year prevalence of various gambling types based on DSM-IV among college student-athletes, by gender

Gambling type based on DSM-IV	Percent		
	Male (n = 10,800)	Female (n = 6276)	Overall (n = 17,076)
Non-gambling	43.1	70.0	53.0
Social gambling	52.6	29.6	44.1
Problem gambling	3.1	.3	2.1
Pathological gambling	1.2	.1	.8

Note: A total of 3663 respondents were excluded from this analysis, mostly due to missing information on the DSM-IV Gambling Screen and gender. See Methods for more details. χ^2 comparison by gender was significant at $p < .05$.

Table 3
Prevalence (%) of various risk behaviors among college student-athletes, by type of gambler

Risk behavior	Non-gambler	Social gambler	Problem gambler	Pathological gambler	Total
	N = 9051 M: 4655 F: 4396	N = 7538 M: 5678 F: 1860	N = 353 M: 337 F: 16	N = 134 M: 130 F: 4	N = 17,076 M: 10,800 F: 6,276
Past-year alcohol use					
All ^a	66.8	86.8	93.2	83.2	76.3
Male ^a	63.9	87.1	93.3	82.4	77.4*
Female ^b	69.6	85.6	92.9	100.0	74.5
Past-month heavy episodic drinking					
All ^a	51.7	76.6	85.5	82.3	63.6
Male ^a	53.0	79.5	86.2	82.6	68.5*
Female ^b	50.4	68.2	64.3	75.0	55.7
Past-year cigarette smoking					
All ^a	7.4	11.5	17.0	29.7	9.5
Male ^a	6.9	10.8	16.5	29.9	9.5§
Female ^b	7.8	13.6	28.6	25.0	9.6
Current marijuana use					
All ^a	7.5	16.5	30.2	35.2	12.1
Male ^a	7.2	17.4	30.1	34.6	13.6*
Female ^b	7.8	14.2	35.7	50.0	9.8
Current other drug use					
All ^a	3.8	6.6	11.0	18.7	5.3
Male ^a	2.9	6.8	10.1	19.2	5.4§
Female ^c	4.8	5.9	25.0	0	5.2
Current gorging/vomiting					
All ^b	2.0	2.7	4.9	8.3	2.4
Male ^b	1.2	2.3	4.8	8.7	2.0*
Female ^d	2.9	3.9	7.7	0	3.2
Past-year unprotected sex					
All ^a	34.2	45.4	57.3	59.1	39.8
Male ^a	37.6	46.8	58.2	58.1	43.4*
Female ^b	30.8	41.5	40.0	75.0	34.0

Note: Pearson χ^2 comparison across four gambler types: ^a $p < .001$; ^b $p < .001$ but with expected cell counts less than 5; ^c $p = .001$ but with expected cell counts less than 5; ^d not significant and with expected cell counts less than 5. Pearson χ^2 comparison between males and females in the population prevalence of each risk behavior, regardless of gambler type: * $p < .001$; § not significant.

ison by gender was significant ($p < .05$). It is important to note that our estimates of gambling prevalence were based on a 12-month time frame, rather than lifetime prevalence.

As presented in Table 3, statistically significant differences ($p < .001$) were found across four types of gamblers in the prevalence of all seven risk behaviors. Further, there appeared to be an upward trend that as the gambling severity increased, so did the prevalence of these risk behaviors. In general, pathological gamblers reported the highest rate of substance use, disordered eating, and unprotected sex, with some exceptions in alcohol use patterns. For example, their past-year alcohol use (83.2%) seemed slightly less prevalent than that among social (86.8%) and problem (93.2%) gamblers. However, their past-month heavy episodic drinking rate (82.3%) was similar to that of problem gamblers (85.5%) and higher than social gamblers (76.6%). When males and females were examined separately, the aforementioned relationship between gambling and risk behaviors remained approximately the same, except that among females, partly due to the extremely small number of pathological gamblers ($N = 4$), the χ^2 cross-group compar-

ison in gorging/vomiting, albeit the seemingly apparent differences, was not statistically significant ($p = .121$).

When the population prevalence of risk behaviors in the entire sample was examined, independent of the gambler type, males were found to have significantly higher rates of alcohol use, heavy episodic drinking, marijuana use, and unprotected sex than females. Females, however, had significantly higher prevalence of gorging/vomiting than males. As to prevalence of cigarette smoking and other drug use, males and females were not significantly different.

The mean number of drug/alcohol-related problems experienced by each type of gambler is reported in Table 4. ANOVA comparison indicated significant cross-group differences, $F(3, 15,171) = 215.801$, $p < .001$. The mean number of problems experienced increased as the gambling level increased, and the linearity test was significant ($p < .001$). Further, the Scheffe pairwise comparisons revealed that non-gamblers had significantly fewer problems than social gamblers ($p < .05$), and that both non-gamblers and social gamblers had significantly fewer problems than problem and pathological gamblers ($p < .05$). While problem

Table 4
Number of drug/alcohol-related problems among college student-athletes, by type of gambler

Type of gambler	All		Male		Female	
	N	Mean (SD)	N	Mean (SD)	N	Mean (SD)
Non-gambler	7934	3.5 [†] (3.6)	3874	3.3 [†] (3.6)	4060	3.7 [†] (3.5)
Social gambler	6847	4.8 [‡] (4.0)	5046	5.0 [‡] (4.0)	1801	4.5 [‡] (3.8)
Problem gambler	286	6.5 [§] (4.3)	273	6.5 [§] (4.3)	13	6.3 ^{†‡} (4.3)
Pathological gambler	108	7.5 [§] (5.0)	104	7.6 [§] (5.0)	4	5.1 ^{†‡} (4.6)

Note: Means in the same columns that do not share symbols differ significantly at $p < .05$ in the Scheffe pairwise comparisons. Number of drug/alcohol-related problems ranged between 0 and 18. See Methods for more details.

SD = standard deviation.

and pathological gamblers experienced significantly more problems than the other two groups, they were not significantly different from each other. When males and females were examined separately, the ANOVA cross-group comparisons remained significant at $p < .001$. The results of Scheffe pairwise comparisons for males stayed the same. For females, however, only non-gamblers had significantly fewer problems than social gamblers ($p < .05$), but other pairwise comparisons were not significantly different.

Discussion

This study represents the first national survey of gambling and risk behaviors among U.S. college student-athletes. The recurring gender differences found in this study highlights the importance of estimating and reporting gambling prevalence figures separately by gender for more accurate cross-study comparisons. This study has also established a clear, direct relationship between gambling severity and health risk behaviors including drug/alcohol-related problems. Pathological and problem gamblers appear to be affected the most in this college athlete population, as has been the case in the general college student population [8]. Further, with a large national sample of athletes, this study adds to prior findings that college athletes used alcohol more commonly and more heavily, but they were less likely to be cigarette smokers or marijuana users, compared with non-athletes [14].

Gender differences in gambling prevalence among athletes

Males consistently had much higher prevalence of gambling and gambling problems than their female counterparts. Depending on the type of gambling activity, the prevalence among males could be as high as almost six times that among females (e.g., wagering on intercollegiate games with an off-campus bookie). While gender differences in gambling prevalence have also been found in other study populations, these results highlight the recurring theme and underscore the importance of assessing male and female gambling behavior separately instead of simply looking at the combined preva-

lence. Such gender-specific information can be instrumental in identifying high-risk gambling activities and devising interventions for appropriate target groups.

Prevalence estimates of problem/pathological gambling among athletes

The present study identified 4.3% of male and 0.4% of female college student-athletes as problem or pathological gamblers in the past year. While no conclusion is to be drawn, it is informative to compare the differences between our prevalence figures and the meta-analytic prevalence estimates synthesized by Shaffer and colleagues [6]—5.6% as level 3 (pathological) and 10.9% as level 2 (problem) gamblers among college students. First, it is important to note that their estimates were based on lifetime data, as was the case for the majority of the gambling literature, whereas our estimates were derived within a past-year time frame. As reported by Volberg [19], lifetime rates of pathological gambling are routinely two to three times higher than the past-year or current rates. Another critical difference is that the DSM-IV criteria were employed in this study, while their estimates were primarily based on the most commonly used instrument, the South Oaks Gambling Screen (SOGS) [20], which has been criticized by some for having the tendency to overestimate [21]. Last but not least, their prevalence estimates were not separated by gender, and given the well-known gender difference in gambling prevalence, their estimates could be biased in either direction, depending upon the gender distributions of their study samples.

Drinking patterns among gambling athletes

While pathological gamblers appeared to use alcohol less commonly than social and problem gamblers, it is important to note that the prevalence of heavy episodic drinking among those who did use alcohol in the past year was the highest among pathological gamblers (98.9%), followed by problem (91.7%), social (88.2%), and non-gamblers (77.4%). This suggests a tendency toward high-risk drinking as gambling severity increases. Although the second highest, the prevalence of heavy episodic drinking among pathological gamblers (82.3%) was well above the popula-

tion average (63.6%) in this college student-athlete sample. Because almost all pathological gamblers who used alcohol engaged in high-risk drinking, one might wonder why proportionately more pathological gamblers did not drink in the past year, compared with problem and social gamblers. The authors suggested two possible explanations. First, for financial reasons, pathological gamblers tend to spend their money on gambling rather than buying alcohol. Second, gamblers tend to drink when socializing with friends, but pathological gamblers are more likely to isolate and immerse themselves in gambling and not socialize, hence not drinking as frequently.

Risk behaviors among college athletes vs. general college students

Consistent with the literature on college student drinking [22], our findings add to evidence that college athletes appear to use alcohol more commonly and more heavily than the general college students. For example, even the non-gambling athletes, who had the lowest prevalence of past-year alcohol use (66.8%) in our student-athlete sample, had a higher rate of drinking than gambling college students (46%), who had higher drinking prevalence than non-gambling college students as reported in a general college student sample [11]. Similarly, the prevalence of heavy episodic drinking among gambling athletes (between 76.6–85.5%) was also well above that among gambling college students (52%).

As to cigarette smoking, marijuana, and other drug use, college student-athletes appeared to have a lower risk profile, compared with the general college students. For instance, even the heaviest smoking athletes (pathological gamblers) had lower prevalence of past-year cigarette use (29.7%), compared with gambling college students (48%) in a general college student sample [11]. Likewise, even the heaviest marijuana-using athletes (pathological gamblers) had lower prevalence of current marijuana use (35.2%) than gambling college students (52%), and the prevalence difference in other drug use was even greater between athletes (18.7%) and general college students (52%).

In regard to disordered eating behavior, a common issue in this field of research is that, other than those using stringent DSM diagnostic criteria, many of the surveys employed different questions and definitions, precluding direct comparisons across studies. Our study defined “binge eating” as gorging followed by vomiting. Among studies with comparable research questions, one prior survey using a nationally representative sample of U.S. college students reported such gorging/vomiting prevalence to be 0.6% (3/507) in females and 0% (0/500) in males [23]. Another more recent college student sample reported prevalence of 2.7% in females and 1.3% in males [24]. In comparison, such behavior seemed more prevalent in our national student-athlete sample (3.2% in females vs. 2.0% in males, $p <$

.001). The present study lends support to the view that college athletes, particularly females, appeared to be at greater risk for developing disordered eating.

Lastly, according to the National College Health Risk Behavior Survey [25], the past-month prevalence of unprotected sex among college students was 45.0%. Due to different time frames, no direct comparisons can be made. However, it is noteworthy that in our athlete sample, problem (57.3%) and pathological (59.1%) gambling athletes had much higher past-year prevalence of unprotected sex than non-gambling athletes (34.2%). In addition, we have also noticed an interesting pattern that unprotected sex was significantly more common in male athletes (43.4%) than female athletes (34.0%), but among the general college students, it was the opposite (38.9% in males and 49.5% in females) [25].

Gambling and drug/alcohol-related problems among athletes

This study found a significant upward linear relationship between gambling severity and the mean number of drug/alcohol-related problems experienced by college student-athletes. Each gambler type was significantly different from one another, except between problem and pathological gamblers, which can be attributed to the smaller sample sizes in these two groups and their similarities. To further examine the differences between these two types of gamblers, future studies can target students attending school in a “pro-gambling” environment with greater access to gambling venues, so as to increase the likelihood of recruiting more problem and pathological gamblers.

Due to differences in the survey questions, no direct comparisons with other studies can be made in terms of the number of drug/alcohol-related problems. However, a recent study in the general college student population also reported that problem and pathological gamblers, while not significantly different from each other, experienced significantly more problems than non-gamblers and social gamblers [8]. Interestingly, pathological gamblers in our athlete sample reported a greater mean number of problems (7.5) than problem gamblers (6.5); however, in the general college student sample, pathological and problem gamblers reported an almost identical mean number of problems (7.4 and 7.5, respectively). While both differences were not statistically significant, it appeared that among athletes, the difference between pathological and problem gamblers was magnified, and pathological gamblers were even more adversely affected by drug/alcohol-related problems.

Conclusions

In conclusion, this study has provided a nationally representative baseline set of data against which gambling and risk behaviors of future cohorts of NCAA student-athletes can be measured. The significant associations found be-

tween gambling and risk behaviors support the persistence of the problem behavior pattern in adolescence and young adulthood [26]. Clearly, there is a need for multifaceted initiatives to tackle these risk behaviors simultaneously. Given the increased levels of risk behaviors associated with increased gambling, perhaps students can be screened for problem/pathological gambling as a way to also identify the high-risk students. As targeted education programs and other interventions are developed, it will be crucial to conduct periodic routine checks of the progress being made in eliminating behaviors that are potentially destructive to the health of college students and to the integrity of their sport.

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