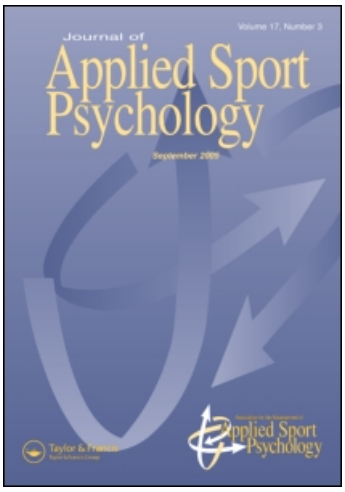

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Stephen Ellenbogen [a]; Durand Jacobs [b]; Jeffrey Derevensky [a]; Rina Gupta [a]; Tom Paskus [c]
[a] McGill University, [b] Loma Linda University, [c] National College Athletics Association,

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STEPHEN ELLENBOGEN
McGill University

DURAND JACOBS
Loma Linda University

JEFFREY DEREVENSKY AND RINA GUPTA
McGill University

TOM PASKUS
National College Athletics Association

Analyzing data from a representative sample of 20,739 U.S. college student-athletes, this study sought to determine whether certain student-athletes were more prone to frequent or problem gambling behavior. Relative to other studies of college students, a lower percentage of National Collegiate Athletic Association (NCAA) student-athletes reported gambling (males 62.4%, females 43%) and having gambling problems (males 4.3%, females 0.4%), but a high prevalence of weekly gambling was reported (males 13.0%, females 3.3%). Male student-athletes in high profile sports (e.g., baseball, football) were more likely to report a gambling-related problem compared to their counterparts in other sports (e.g., track & field, volleyball). Sports wagering remains a cause for concern. Only a very small number of student athletes reported major infractions such as attempting to alter the outcome of a game or sharing inside information. Future research should investigate why certain student-athletes are more prone to develop gambling problems.

Over the past two decades, investigators and policy-makers have been paying closer attention to gambling among college and university students, particularly among student athletes. The subject of numerous studies (Engwall, Hunter, & Steinberg, 2004; Winters, Bengston, Dorr, & Stinchfield, 1998), mass media stories (Layden, 1995a, 1995b, 1995c; Person, 2006), and even a government investigation (Hartle, 2001), this attention has led to efforts to reduce problem gambling on college campuses (Takushi et al., 2004), and to stop legalized gambling on college sporting events (National Gambling Impact Study Commission, 2001).

Gambling among student athletes represents a multifaceted problem, particularly when examining sports wagering. If student athletes incur significant losses or develop associations with other gamblers, they may be pressured to use or share information concerning collegiate games, or possibly alter their performance to influence the outcome of games. Also, gambling

Received 21 July 2006; accepted 12 June 2007.
Address correspondence to Stephen Ellenbogen, McGill University, 3724 McTavish Street, Montreal, Quebec, H3A 1Y2. E-mail: Stephen.Ellenbogen@mcgill.ca

habits acquired in young adulthood may develop into more severe gambling problems later in life. For those who become professional athletes, the repercussions may be considerable. The National Gambling Impact Study Commission (Hartle, 2001, p. 2) concluded that "sports wagering threatens the integrity of sports, puts student athletes in a vulnerable position, it can serve as gateway behavior for adolescent gamblers, and it can devastate individuals and careers." For these and other reasons, the NCAA eligibility rules prohibit any participation in gambling. The punishment for sports betting is severe (Rockey & King, 2006); student athletes caught wagering on professional or amateur sports contests receive a minimum one-year suspension, and those betting on a contest involving their institutions are subject to a lifetime ban. Naturally, an important concern of policy-makers is whether a substantial amount of rules infractions related to wagering on college sporting events exists.

Research into gambling among college students has generally found that students' rates of gambling and problem gambling are particularly high (Clarke, 2003; Engwall et al., 2004; Ladouceur, Dubé, & Bujold, 1994; Lesieur, Cross, Frank, Welch, White, Rubenstein, et al., 1991; Shaffer, Hall, & Vanderbilt, 1999; Winters et al., 1998). However, others have concluded that college students do not gamble more than other adults, and speculated that they are not at increased risk for problem gambling (LaBrie, Shaffer, LaPlante, & Wechsler, 2003). Investigations into whether student athletes demonstrate a particularly high gambling participation rate and are vulnerable to developing gambling-related problems have also garnered mixed results.

In the USA, Engwall et al. (2004) examined the results of a survey of 1,348 college students in Connecticut. Students participating in either club or intercollegiate sports programs were found to be significantly more likely to have gambling problems. Over one-quarter (26%) of males and 7% of females were considered problem or pathological gamblers, as assessed by the South Oaks Gambling Screen (SOGS); almost double the rates for male (16%) and female (4%) college students who did not participate in collegiate athletics. However, their definition of a student athlete was students playing club sports, and the sample included only students from one state. Given that there can be marked regional differences in problem gambling rates (Volberg, 2002), it is unsure whether these findings are generalizable to the larger varsity athlete population.

LaBrie et al. (2003), using a limited number of gambling questions, analyzed data from a representative sample of more than 10,000 college students. The authors reported that males were more likely to gamble if they considered athletics important, participated regularly in physical activities, and were on an intercollegiate sports team. However, several other factors proved to be stronger predictors of gambling, notably alcohol use and frequent television watching. Females involved in athletics were not found to be more likely to gamble. Unfortunately, problem gambling was not measured.

In another study, Rockey, Beason, and Gilbert (2002) investigated the gambling behavior of 954 students in nine southeast U.S. colleges, 129 of which were members of intercollegiate varsity teams. Compared to the other students in the survey, athletes were no more likely to have participated in gambling activities. Male athletes were found to have high rates of pathological gambling, as assessed by the SOGS, but the differences were not statistically significant. Compared to female students, female athletes had significantly lower rates of pathological gambling. Finally, Kerber (2005) examined the gambling activities of 636 student athletes in three Midwest U.S. universities. According to their SOGS scores 21% of male respondents and 5% of female respondents were classified as problem or pathological gamblers.

Analyzing a survey involving 648 student-athletes playing Division 1 football or basketball, Cullen and Latessa (1996) reported that one-quarter of the sample gambled on sporting events. However, few student athletes reported gambling on games in which they were playing (3.7%), or receiving money for playing poorly (0.5% to 1.1%). Nevertheless, the authors concluded that the gambling among college athletes warrants special attention, particularly since the number of serious rules infractions may have been underestimated. The response rate for the study was only 32%. Cross and Vollano (1999) reported comparable prevalence rates; 37% of male student athletes claimed to have wagered on sports, 1.9% reported gambling on games in which they played, and 0.4% admitted to receiving money for playing poorly. Their sample included only football and basketball players (460 males; 298 females), and the response rate was low (25.3%).

Research has generally supported the conclusion that college student athletes may be at increased risk of developing gambling-related problems, compared to the student population in particular and to other adults in general. However, these studies employed the SOGS, which measures lifetime gambling problems. It is uncertain whether the student-athletes were experiencing gambling problems during their college years. There is much debate on how to measure gambling problems (Derevensky & Gupta, 2006). Direct comparisons of existing measures tend to reveal fairly high rates of agreement (Derevensky & Gupta, 2000; Strong, Lesieur, Breen, Stinchfield, & Lejuez, 2004), but each is subject to different criticisms. Measures based on the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR), the gold standard among mental health professionals, are thought to be insensitive to early indications of a gambling problem (Cox, Enns, & Michaud, 2004). Stinchfield, Govoni, and Frisch (2005) also noted that current clinical cut-off score standards (endorsing five or more items on the scale) resulted in a failure to identify 20% of a sample that was receiving treatment for pathological gambling. The SOGS is based on an outdated version of the DSM (DSM-III) and is thought to produce an inflated rate of pathological gambling (Abbott & Volberg, 1999). A measure based on the current DSM was administered in this study.

Curry and Jiobu (1995) theorized that athletes are at increased risk for gambling problems because of the competitive spirit fostered in their social environment. If this is the case, student athletes in the most competitive environments (i.e., sports in which lucrative professional contracts, television appearances, endorsement deals, and other valued objects are at stake) would likely be at greatest risk for developing gambling problems. Given that two studies reporting high gambling participation rates (Cross & Vollano, 1999; Cullen & Latessa, 1996) examined only football and basketball players, it is reasonable to suggest that the risk may be higher for athletes in these high-profile sports.

Alternatively, one may suggest that gambling among members of team sports is commonplace because they share a unique bond, one possibly characterized by friendly competitions, “one-upmanship”, risk-taking, and boastfulness. Despite the associated risks, gambling serves as a bonding activity. Finally, Gupta, Derevensky, and Ellenbogen (2006) found that certain personality types (e.g., sensation seekers) are more likely to develop gambling problems, and Cross, Basten, Hendrick, Kristofic, and Schaffer (1998) discovered that student athletes who engage in sports wagering were also more likely to be risk-takers. It could be that certain sports attract such personality types. A comparison of the gambling of student athletes in different sports is therefore warranted.

The first objective of the present study was to examine whether there existed a relatively high prevalence of gambling and problem gambling among a large and representative sample of American college student athletes. As numerous other studies have found that males were more likely than females to gamble, and to develop gambling problems (Engwall et al.,

2004; Greenberg, Lewis, & Dodd, 1999; LaBrie et al., 2003), a second objective was to examine whether gender differences would hold true among college student athletes. The third objective was to determine whether student athletes participating in different divisions, sports, or types of sports (i.e., team sports or high-profile sports) demonstrate an elevated risk for gambling-related problems. It is crucial to specifically investigate the gambling and problem gambling among Division I student athletes in high-profile sports, as they are involved in games on which the majority of college sports wagering occurs. Their association with gamblers and bookmakers represents a grave threat to the integrity of NCAA sports. Also, this kind of examination may help explain why prior studies of student athletes have yielded such differing prevalence estimates and guide policy. Finally, the extent to which these college student athletes breach the rules concerning gambling was scrutinized.

METHOD

Participants

The present study utilized data from the 2003 NCAA National Study on Collegiate Sports Wagering and Associated Health-Risk Behaviors, a representative and national assessment of gambling behavior among U.S. college student athletes. Ethics approval was obtained from the Institutional Review Board at the University of Denver and respective colleges where the athletes resided. The sampling plan was designed so that at least 12% of the NCAA member institutions that sponsor a given sport surveyed their athletes. A computer program randomly selected NCAA sports teams. To minimize institutional burden, no school was asked to collect responses from more than three of its athletics teams. Students from 2,003 sport teams at 1,032 member institutions participated in the study. Because the study methods were designed to guarantee responding student athletes' anonymity, no data were available on a school-by-school or team-by-team basis. Therefore, no exact response rate could be calculated, however it was estimated to be between 65% and 75%, based upon previous surveys conducted in this manner and the total number of surveys completed.

A total of 20,739 valid surveys were received from the institutions that responded. Among respondents indicating gender, approximately 62% were males and 38% were females. Males were slightly overrepresented in the sample responses, compared with the full NCAA student-athlete population (males 58%, females 42%; NCAA, 2003). Among student-athletes reporting their race/ethnicity, 75% described themselves as white, 15% as African-American, and 10% as being from another racial/ethnic group. These proportions approximate those seen in the overall population of student athletes.

Survey Administration

A letter was sent to the Faculty Athletics Representative (FAR) of each selected NCAA member institution, requesting cooperation in conducting the survey. Detailed instructions concerning protocol and survey administration were presented. It was emphasized to FARs and student-athletes that participation in the study was completely voluntary and all responses were anonymous and confidential.

The FARs distributed the survey to all members of a particular team at an appropriate team gathering. A pre-addressed, pre-paid envelope was provided, into which student athletes deposited surveys upon their completion. The last student to complete the survey was asked to seal the envelope and forward it directly to the NCAA. These procedures reassured students that the process would allow them to remain anonymous and all material was confidential.

Survey Content

In addition to demographic information, the survey collected opinions about and experiences with sports wagering, other forms of gambling, and other associated health-risk behaviors. The survey included a total of 102 questions.

All gambling questions referred to the student-athletes' behavior in the previous 12 months. Students were asked about their frequency of participation ("daily", "at least once a week", "at least once a month", "less than once a month", and "not at all") for 14 gambling activities. Students who indicated having gambled were instructed to complete a questionnaire format of the DSM-IV-TR (American Psychiatric Association, 2000) problem gambling criteria. Because it is based on the most recent version of the DSM, it is considered the current gold standard for psychological assessment of pathological gambling (American Psychological Association, 2002). In a recent evaluation of the questionnaire format of the DSM-IV-TR, Stinchfield, Govoni, and Frisch (2005) reported strong internal consistency (.92), a single factor structure with high factor loadings (.60 to .87), and an 87% agreement rate with the SOGS. The instrument has ten questions concerning various symptoms associated with a gambling problem including: preoccupation with gambling, tolerance (a need to gamble more for desired excitement level), inability to control gambling, withdrawal symptoms, escape, chasing losses, lying to family, committing illegal acts to pay for gambling, disruptions to family or job, and borrowing money to pay for gambling debts. The cut-off scores recommended for the interview method of the DSM-IV-TR (American Psychiatric Association; 2000) were used. A student experiencing five symptoms or more was considered Probable Pathological Gambling (PPG); those reporting three or four symptoms were classified as At-Risk, and individuals reporting two symptoms or less were categorized as social gamblers. The survey included several questions ascertaining sports-related gambling behavior, knowledge of the NCAA rules concerning sports wagering, and NCAA rules infringements. Students also indicated the three primary reasons they gambled.

Data Analysis

Given that the sample size was large and that 92 statistical analyses were performed, the threshold probability for reporting statistical significance was lowered from the usual level of .05 to .005. This served to minimize the number of spurious findings. The only exception was the testing of student athletes by division and profile of sport. As the sample sizes for these analyses were considerably smaller, a level of .01 was established as the acceptable level. Chi Square tests were performed using SPSS software. The Phi coefficient was provided as a measure of the strength of association; this is essentially a simplified calculation of the Pearson correlation between two dichotomous variables (Calkins, 2005).

Two groups were excluded from the examination of problem gambling (i.e., all statistical tests involving the DSM-IV-TR). First, 3,275 students (16%) who gambled in the last twelve months did not complete the DSM-IV-TR problem gambling screen, and second, 2,856 students (14%) who reported not having gambled in the last twelve months had completed the problem gambling screen despite instructions to skip this section. Of this latter group, 18 students met the criteria for At-Risk gambling, and 31 were classified as PPGs. Some of these students were likely recovering from a gambling problem. In fact, 50% of them indicated they had sought help for a gambling problem.

RESULTS

Description of the Sample

Males and females were compared with respect to socio-demographic and educational characteristics. On the question concerning race, a higher percentage of male (17%) than female (10%) student athletes indicated that they were Black (χ^2 (1, 20,349) = 171.8, $p <$ .0005), and a higher proportion of females (80%) than males (72%) indicated that they were White (χ^2 (1, 20,349) = 149.8, $p <$ .0005). No significant gender differences were found with respect to religion. The most revealing gender difference concerned motivation for being in college. Male student-athletes were more likely than female student-athletes (13% vs. 3%, χ^2(1, 19,266) = 562.7, $p <$ .0005) to express the goal of entering professional sports, and were less likely to report wanting to 'get a job' (44% vs. 48%, χ^2(1, 19,266) = 350.0, $p <$ .0005) or move onto post-graduate studies (19% vs. 31%, χ^2(1, 19,267) = 352.9, $p <$.0005) after college. As such, it was not surprising that fewer male than female student athletes (49% vs. 69%, χ^2(1, 20,090) = 759.3, $p <$ .0005) reported a GPA of 3.0 or better.

Gambling and Gambling-Related Problems by Gender and Race

Overall, 55% (males 62.4%, females 42.8%) of the sample reported gambling in the past year, 7.9% (males 13.0%, females 3.3%) gambled weekly, 2.1% (males 3.1%, females 0.3%) were at-risk for a gambling problem, and 0.8% (males 1.2%, females 0.1%) were PPGs. Male and female college student athletes were compared on a number of measures concerning their gambling behaviors and indicators of a gambling-related problem. Weekly and past year prevalence rates with respect to different types of gambling are presented in Table 1. Prevalence information concerning a number of important gambling-related issues (i.e., knowledge of NCAA rules, betting on NCAA games, amounts wagered, and gambling

Table 1
Gender Differences in Participation in Different Types of Gambling

	Gambling in past year			Weekly gambling		
	Male	Female	Phi	Male	Female	Phi
Table games at casino	18.5	7.6	.150**	0.9	0.1	.048**
Games of skill	38.0	13.3	.266**	5.3	0.6	.123**
Stock market	10.1	3.4	.124**	2.2	0.7	.058**
Bingo	6.4	7.4	−.020*	0.3	0.3	
Dice	13.0	3.4	.161**	1.5	0.4	.053**
Internet (casinos)	6.4	2.1	.098**	1.4	0.3	.052**
Football pools	21.1	5.6	.210**	4.0	0.4	.108**
Horse races	9.5	4.6	.090**	0.5	0.2	.028**
College sports (using bookie)	4.7	0.9	.104**	1.0	0.1	.055**
Lottery	35.7	28.5	.075**	3.0	1.1	.063**
Electronic gambling machines	19.2	13.0	.081**	0.8	0.3	.036**
Other forms of gambling	24.4	7.4	.216**	3.5	0.4	.100**
Any gambling	62.4	42.8	.191**	13.0	3.3	.162**

Note: Percentages are presented. The Phi statistic is presented as estimates of effect size. Males (n = 12,795) and females (n = 7,734).
**$p <$ .0005. *$p <$ .005.

Table 2
Gender Differences on Issues Related to Gambling

	Total Sample			Among Weekly gamblers		
	Male	Female	Phi	Male	Female	Phi
Knows NCAA rules on gambling	49.6	47.9		49.5	58.1	
Does not know rules	19.4	16.7	.034**	23.4	18.3	
Not sure of rules	31.0	35.4	.045**	27.1	23.6	
Bet on games involving team	2.0	0.7	.052**	4.8	3.3	
Bet on games involving another school team	4.1	1.0	.086**	11.2	7.7	
Bet on games involving other teams in the same sport	9.7	1.8	.149**	21.9	7.6	.116**
Problem Gambling						
At-risk	3.1	0.3	.097**	13.5	4.2	.091**
PPG	1.2	0.1	.062**	6.4	1.0	.073*
Size of Wager Amount						
Sports wager over $25	8.6	0.7	.165**	30.0	6.3	.181**
Sports wager over $100	3.4	0.2	.105**	15.4	2.8	.124**
Other wager over $25	10.0	1.7	.160**	24.9	7.5	.141**
Other wager over $100	4.3	0.6	.108**	13.1	5.5	.078*

Note: The Phi statistic is presented as estimates of effect size.
**$p < .0005$. *$p < .005$.
For total sample: males (n = 12,795) and females (n = 7,734).
Among weekly gamblers: Males (n = 1,497) and females (n = 208).

problems) are presented in Table 2. Males were more likely to participate in all types of gambling except bingo. More importantly, they were also more likely to report indications of a gambling-related problem. Male student-athletes were two to four times more likely to engage in college betting, and wager over $100 in a single day. Gender differences in the prevalence of at-risk and pathological gambler were even greater.

For males, the percentage of gamblers was highest among Division III student-athletes, followed by Divisions II and I (71%, 60%, and 56% respectively), $\chi^2(2, 12{,}641) = 234.11$, $p < .0005$. The same trend was noticed for weekly gamblers (15%, 12%, and 11% respectively), $\chi^2(2, 12{,}641) = 35.27$, $p < .0005$. For females, participation was greatest in Division II and III compared to Division 1 for past year gambling (47%, 47%, and 37% respectively, $\chi^2(2, 7{,}588) = 67.42$, $p < .0005$) and weekly gambling (3.9%, 3.7%, and 2.5% respectively), $\chi^2(2, 7{,}588) = 9.31$, $p < .01$. No significant differences between the three divisions were observed for problem gambling.

Males and females who reported belonging to the three largest racial groups were compared with respect to gambling participation and problem gambling (see Table 3). In general, White student athletes were significantly more likely to report that they gambled in the past year and gambled weekly. However, they were not more likely to develop gambling problems. Hispanic males reported the highest PPG rates.

Gambling and Gambling-Related Problems by Type of Sport

Male and female student athletes were examined separately by sport played, excluding sports with a sample size of less than 100. The prevalence of gambling and problem gambling among male student athletes in different sports are presented in Figure 1. Several trends are worthy of

Table 3
Racial Differences in Gambling Participation and Problem Gambling

	Male			Female		
	White n = 7741	**Black n = 1910**	**Hispanic n = 460**	**White n = 4900**	**Black n = 714**	**Hispanic n = 243**
Past Year Gambler	61.1**	36.8**	41.0**	31.8**	23.2**	23.1
Weekly Gambler	14.9**	9.7**	10.9	2.8	4.3	3.3
At-Risk Gambler	3.3	2.6	2.9	0.2	0.4	.4
PPG	1.2	1.0	2.9*	0	0.3	0

Note: Percentages are presented. An asterisk indicates that the racial grouping is significantly different from the average for the other student-athletes.
*$p < .005$.
**$p < .0005$.

note. Members of the golf, ice hockey, and baseball teams were most likely to gamble weekly and develop gambling-related problems. Student-athletes involved in track and cross-country running demonstrated relatively low prevalence rates of problem and frequent gambling. The prevalence of gambling and problem gambling among female athletes in different sports is presented in Figure 2. Only golfers demonstrated relatively high gambling participation rates.

Team sports were defined as any sport that involves passing a ball or puck between players. For example, water polo was classified as a team sport, while tennis was classified as an

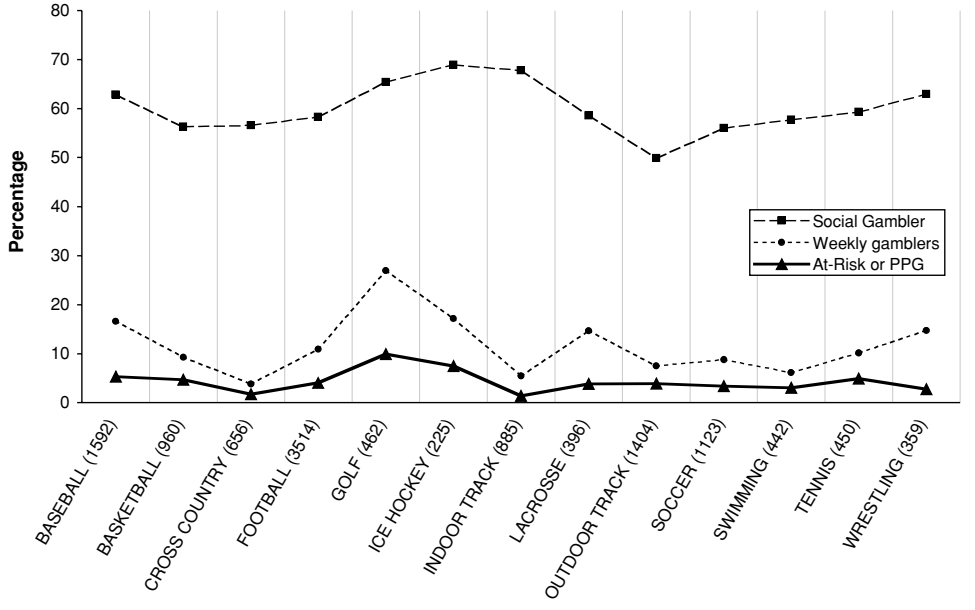

Figure 1. Gambling and problem gambling among male student athletes across different sports. Sample sizes are presented in brackets.

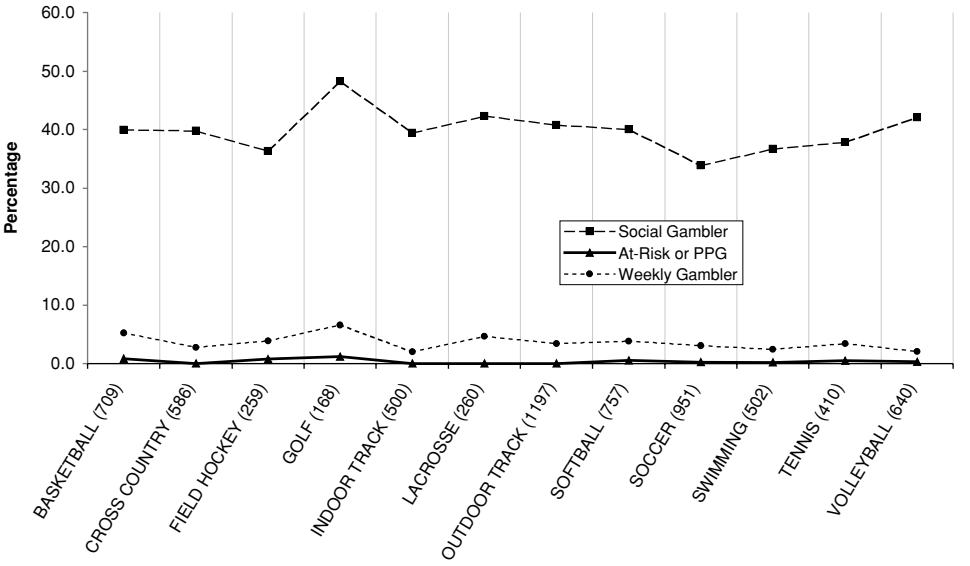

Figure 2. Gambling and Problem Gambling among Female Student Athletes Across Different Sports. Sample sizes are presented in brackets.

individual sport. Although the profile of a sport can be subject to debate, the authors defined high profile as regularly televised sports (i.e., baseball, basketball, football, golf, ice hockey, soccer, and tennis). The only significant difference between student-athletes in team and individual sports was that members of team sports were more likely to gamble (64.0% vs. 60.7%), $\chi^2(1, 12{,}481) = 13.5$, $p < .0005$. Student-athletes in high profile sports were more likely than other student-athletes to gamble (64.3% vs. 59.7%, $\chi^2(1, 12{,}481) = 24.1$, $p < .0005$), gamble weekly (14.4% vs. 10.3%, χ^2 $(1, 12{,}481) = 41.2$, $p < .0005$), be at-risk gamblers (3.5% vs. 2.0%, $\chi^2(1, 10{,}569) = 12.6$, $p < .0005$), be PPGs (1.5% vs. 0.7%, $\chi^2(1, 12{,}481) = 8.5$, $p < .005$) and place more than \$100 on sports wagers (3.9% vs. 2.6%, $\chi^2(1, 12{,}481) = 14.6$, $p < .0005$) and non-sport wagers (5.0% vs. 3.1%), $\chi^2(1, 12{,}480) = 23.3$, $p < .0005$.

Table 4
Comparisons Between Male Student Athletes Participating in High Profile and Other Sports across Divisions

	High-profile sports/Other sports		
	Division 1	**Division 2**	**Division 3**
Any gambling last year	57.4/54.8	63.1/51.2*	71.7/69.7
Weekly gambling	12.7/9.0*	13.7/8.6*	16.5/12.6*
College sports wagering‡	4.0/2.7	5.1/6.1	6.5/4.3*
At-risk/PPG	4.7/1.8*	4.8/3.0	5.6/3.9

Note: Percentages are presented.
*$p < .01$. ‡Involving on or off-campus bookmakers.

Table 5
Rules Infringement among Selected Division I Student-Athletes

	Men's Basketball N = 388	Men's Football N = 2132
Taken money for playing poorly in a game	0.5	1.1
Asked to provide inside information about a game	1.2	2.0
Provided inside information about a game	1.2	2.8
Asked to affect the outcome of a game	2.1	2.3
Affected the outcome of a game	1.0	1.4
Bet on games involving team	1.5	2.5

Note: Percentages are presented.

After layering the results by Division, it was noticed that the relationship between profile of the sport and susceptibility to gambling problems was evident for Division I student athletes only (see Table 4). Athletes in high-profile sports were generally more likely to gamble weekly. The same analyses were performed for female athletes. Although there were trends towards increased gambling participation and gambling problems for females in high profile sports, no statistically significant differences were found.

The proportion of Division I male football and basketball players who have self-reported major infractions of gambling bylaws is reported in Table 5. In general, a small minority of college student-athletes reported committing serious violations of NCAA gambling rules, with the most frequently reported violation reported by football players providing information about a game (2.8%).

DISCUSSION

Numerous studies have found that the prevalence of gambling and problem gambling of college students to be roughly equivalent to that of adolescents and higher than that of adults (Engwall et al., 2004; Shaffer et al., 1999). LaBrie and colleagues (2003) conducted a large-scale study of college gambling using a representative sample and concluded that although 88% of students gambled, 2.6% gambled on a weekly basis. Comparing a general population of college students to college student athletes, the results of the present study suggest that while student-athletes are less likely to gamble (55%), they were three times more likely to be weekly gamblers (7.9%). This raises concerns that there exists a significant proportion of college athletes experiencing gambling problems at a sub-clinical level (Shaffer, Hall, & Vanderbilt, 1999), and that their gambling may intensify and become problematic. A second concern is that sports wagering, a serious violation of NCAA rules, remains a popular form of gambling among student athletes, with more than 20% of males participating in football pools and almost 5% wagering with bookmakers. Finally, almost one half of the sample was either unsure or unaware of the NCAA rules concerning college gambling; this problem is being addressed by the NCAA task force and the Department of Agent, Gambling and Amateurism Activities within the NCAA.

While many student athletes were found to gamble on a weekly basis, the rate of pathological gambling among athletes (0.8%) was well below that of adolescents (estimated to be between 4.4% and 7.4%; Derevensky & Gupta, 2000), and quite similar to that of adult studies using similar measures. Cox et al. (2004) estimated this rate to be 1.3% using the DSM and 2.6% using the SOGS criteria. Moreover, even if the prevalence rate in the present study were doubled to reflect the difference between the DSM and the SOGS found by Cox et al., the

PPG rate (1.6%) would still fall well within the range of estimates; most community studies reported a rate of pathological gambling of between 0.4% and 3.4% in the adult population (American Psychiatric Association, 2000).

This finding is inconsistent with the conclusions of other researchers that the prevalence of pathological gambling among student athletes is higher than that of adults (Engwall et al., 2004; Kerber, 2005). A number of explanations can be offered for this divergence. It may be that the rate of problem gambling among student athletes has diminished in recent years, either as a result of NCAA rules concerning gambling or other situational factors (e.g., reflections of where the population resides and the amount of available gambling). The divergence may be attributable to the characteristics of the instruments used to assess problem gambling or other methodological differences. Another possibility is that earlier studies sampled a limited number of institutions; LaBrie et al. (2003) suggested that schools where many students gamble might be more likely to be the subject of such a study. As well, the response rates for these studies were low; it is uncertain whether the sample is truly representative of the population of athletes in that institution and of student athletes in general. In the present study, student athletes proved to be a particularly heterogeneous group, and athletes from different sports did not present the same risk for gambling-related problems.

Male athletes in high-profile sports were generally more likely to gamble, gamble frequently, place wagers of more than $100, and have gambling problems. To help explain this phenomenon, the unique situation of these student-athletes should be considered. Compared to other sports, there is generally more gambling on high-profile sports, including games in which these students are involved. Student athletes in high profile sports often face substantial pressure to succeed. Moreover, they generally perform before large audiences in enormous venues, and can quickly acquire a celebrity status at their school. The confluence of these factors may create circumstances in which the young athlete is likely to socialize with those gambling, play for high stakes, and use gambling to relax, raise the level of competition, or bond with other student athletes. It is also plausible that high-profile sports attract individuals who are particularly competitive and risk-takers; these are personality types associated with problem gambling (Cross et al., 1998; Gupta et al., 2006).

Reviewing the literature, Raylu and Oei (2004) concluded that certain minority groups are similarly vulnerable to gambling problems. It might therefore be argued that the high rates of gambling and problem gambling among student athletes in high-profile sports are attributable to the high proportion of visible minorities from low-income communities. However, the largest grouping (Black student-athletes) reported below average involvement in gambling, and only the Hispanic grouping had above average pathological gambling rates. As well, the two high-profile sports with the largest problem gambling rates (golf and ice hockey) count few visible minorities among the professional ranks. It may therefore be concluded that at least part of the reason for the high prevalence of gambling and gambling problems lies in the nature of high-profile sports, the personalities of the athletes attracted to these sports, or a combination of both.

The results of the present study were consistent with most research on gender differences in gambling (Engwall et al., 2004; Greenberg et al., 1999; LaBrie et al., 2003). Female college student athletes gambled less and were less prone to gambling-related problems, compared to males. There were more female non-gamblers than gamblers, and only one in a thousand female athletes was identified as a pathological gambler. Slightly more than 3% were weekly gamblers, and one third of these were purchasing lottery tickets (a non-sport gambling activity associated with lower risk). In fact, the prevalence of gambling and problem gambling for females was so low, compared to either the males in the present sample or females in other studies, that one wonders whether participation in athletics may insulate them from the world

of gambling and its associated risks. Rockey et al. (2002) also found particularly low rates of pathological gambling among female student athletes. Part of the reason for this may be that women participate in fewer matches that attract large amounts of wagering (e.g., compared to football). As well, they may be more compliant with NCAA rules banning gambling. Finally, it should be noted that female student athletes obtained better grades, and had higher academic aspirations than their male counterparts, possibly because of a limited number of opportunities for professional sports.

Curry and Jiobu (1995) suggested that the socialization of athletes includes an emphasis on competition, and that this competitive environment places them at greater risk for gambling-related problems. Analyzing the results of the present study, a different theory may be proposed. Certain competitive sports environments may act as a risk factor for problem gambling, but other competitive sports environments have exactly the opposite effect. One would thus expect considerable variation in problem gambling rates between colleges offering different sports programs. This may also help explain why prior studies have yielded such divergent results.

One unexpected finding was the high prevalence of problem gambling among golfers, although this is often considered part of the culture of the sport. While the sample sizes are too small to draw firm conclusions, it is cause for concern. One wonders whether participation in certain high profile individual sports represents a particular risk factor. Golfers face similar pressures as student athletes in high-profile team sports, but because of the individual nature of the sport, the camaraderie between golfers is likely different and they may have less opportunity to vent their fears and frustrations among other golfers. Alternatively, it could be related to the culture of this sport. Wagering on golf games is quite common amongst friends. The nature of golf is such that one may make multiple wagers in one game (e.g., lowest score, closest to the pin, longest drive).

It would be of considerable concern if Division I male basketball and football players tried to influence the outcome of a game or provided pertinent information on their team, given the significant amount of wagering on games involving these athletes. Typically, only 1–2% of student-athletes reported breaking such rules. These results are consistent with previous studies (Cross & Vollano, 1999; Cullen & Latessa, 1996). In all likelihood, those who envisage becoming professional athletes do not want to jeopardize their college or professional careers. Nevertheless, the few players who do report such infractions are cause for concern. While there is no way of ascertaining whether this is a generalizable finding across all Division I schools, given that there are over forty players on a football team, the results suggest that an average of one athlete per team may be sharing information or attempting to influence the outcome of the game for wagering purposes. Such infractions, when discovered, are not only devastating for the individual but for the team and school itself. The history of collegiate athletics is replete with scandals (Hartle, 2001).

Similar to other potentially addictive behaviors such as alcohol and drug use, gambling is rapidly becoming an important policy issue. Pathological gambling is thought to be slightly less prevalent than alcohol dependence but more common than most other addictive behaviors. Estimates of past-year 'abuse or dependence' were 5% for alcohol, 1.2% for Cannabis, and 0.8% for cocaine (American Psychiatric Association, 2000). However, given the proliferation of Internet gambling and television shows that glorify gambling (in particular poker), there is reason to be concerned that gambling will become increasingly accessible and popular on college campuses. Regular national campaigns are therefore warranted to sensitize all college students to the hazards of gambling and to reaffirm to all student athletes the NCAA regulations regarding gambling. These campaigns should make reference to the fact that problem and frequent gambling are associated with poor academic performance, suicide attempts, risky sexual behaviors, illicit drug use, binge drinking, and alcohol abuse (Engwall

et al., 2004; Ladouceur et al., 1994; Lesieur et al., 1991; Winters et al., 1998) and may result in their suspension or a revoking of their eligibility to play. Additionally, some student athletes who develop gambling problems are aware of the risks that this behavior poses to their athletic careers and may be particularly reticent about asking for help. It is therefore important to inform students of the existence of resources where they can confidentially receive information and treatment for gambling-related problems. Given the sizable differences in the prevalence of problem gambling among different groups of athletes, it would also be advisable to develop additional strategies targeting the most vulnerable populations (Rockey & King, 2006). Additional research is needed to better understand why gambling and problem gambling is more prevalent in certain sports programs, and to assess what type of prevention programs would be most effective.

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