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Gambling Behavior of Student-Athletes and a Student Cohort: What are the Odds?

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Abstract This study investigated the prevalence of gambling, gambling related NCAA violations, and disordered gambling in student-athletes (n = 736) with a comparison cohort of students (n = 1,071) at four universities. Student-athletes reported similar rates of gambling frequency, use of a bookmaker, and disordered gambling as students. After accounting for demographic differences, student-athletes were less likely to engage in sports wagering than students. Several risk factors for disordered gambling were identified, including being male and reporting at least one parent with a history of gambling problems. These findings suggest that problems associated with gambling are a university-wide issue with student-athletes meriting additional attention because of implications for the integrity of intercollegiate sports. Improved prevention and intervention efforts for collegiate gambling are recommended.

Keywords Student-athletes · Pathological gambling · College students · Gambling risk factors

Introduction

High profile events within several National Collegiate Athletic Association (NCAA) Division I programs have highlighted the risks of gambling by college athletes. In these situations the student-athlete intentionally performed poorly for the purpose

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of influencing a game's outcome for pecuniary gains (Barr, Graham, & Asher, 1998). The concern is that student-athlete gambling could potentially diminish the integrity of intercollegiate sports and the universities themselves. Recent reports have suggested that a majority of student-athletes gamble, many in violation of NCAA rules, and a small but noteworthy proportion of these athletes experience significant problems related to their gambling (Cross & Vollano, 1998; Cullen & Latessa, 1996; Engwall, Hunter, & Steinberg, 2004; NCAA, 2004a; Rockey, 1998). In response the NCAA and its constituent universities have begun to consider how to address gambling within college athletics.

An effective response to student-athlete gambling might benefit from considering that student-athletics are embedded in the context of university communities. Like student-athletes, many college students gamble, some on sport, and some experience significant problems due to their gambling (Engwall et al., 2004; LaBrie, Shaffer, LaPlante, & Wechsler, 2003). A response to gambling by student-athletes should consider the similarities between the gambling of student-athletes and their non-athlete peers. The current project was designed to replicate and extend previous studies on student-athlete gambling by including a sample of non-athlete students from the same institutions. If student-athletes' gambling is different from that of college students, then efforts to address gambling need to focus on the student-athlete subculture. If student-athletes' gambling behavior is similar to the behavior of their non-athlete peers, then gambling would be best understood as a university wide phenomenon in which student-athletes face unique circumstances due to the prohibition against and consequences for sports wagering.

College Student Gambling

Estimates of gambling among college students range from 42% to 85% (Engwall et al., 2004; LaBrie et al., 2003; Lesieur et al., 1991; Winters, Bengston, Dorr, & Stinchfield, 1998). Additionally, it is estimated that between 4% and 14% of college students exhibit a pattern of gambling associated with moderate levels of adverse consequences, that is, problem gambling, and that 3–6% of college students gamble in a pattern sufficient to warrant a diagnosis of pathological gambling (Engwall et al., 2004; Shaffer, Hall, & Vander Bilt, 1999). Pathological gambling has been characterized as ''persistent and recurrent maladaptive gambling behavior that disrupts personal, family, or vocational pursuits'' (American Psychiatric Association [APA], 1994, p. 615). As recommended in the literature (Shaffer et al., 1999), we use the term disordered gambling to discuss problem and pathological gambling together.

Though the prevalence rates of disordered gambling should be cause for concern, a survey of universities found only 60% recognized gambling as a problem among their student population (Shaffer, Forman, Scanlan, & Smith, 2000). Among those universities only 39% had an identified individual for handling gambling-related problems. This suggests the need for increased efforts to educate university officials about their students' gambling activities and the potential costs of this gambling.

Although informative, prevalence rates of disordered gambling do not allow for analysis of who is most at-risk. Data on risk factors increase our understanding of the etiology of the disorder and aid the development of appropriate, cost effective, prevention and intervention programs. Toward this end investigators have begun to identify risk factors for disordered gambling. One common risk factor is gender;

males in every age group, across race and socio-economic class are significantly more likely to experience gambling problems (Shaffer et al., 1999). Other risk factors among college students include positive parental history of gambling problems, frequent alcohol and/or drug use, fraternity affiliation, and poor academic achievement (Engwall et al., 2004; LaBrie et al., 2003; Winters et al., 1998).

Student-Athlete Gambling

Three unpublished studies have reported divergent estimates of gambling among student-athletes (Cross & Vollano, 1998; NCAA 2004a; Rockey, 1998). Rockey (1998) found that 81% of 129 student-athletes have gambled in their lifetime. Cross and Vollano (1998) found that 72% of 758 football and basketball student-athletes gambled while attending college. The NCAA (2004a), in a study of over 20,000 student-athletes from over 1,000 different universities, found gender differences in past year gambling participation prevalence rates with over 60% of male athletes and approximately 50% of female athletes gambling. Estimates of disordered gambling indicate rates equivalent to or greater than that found in college non-athlete students (Engwall et al., 2004; NCAA, 2004a; Rockey, 1998). However, these studies either defined student-athlete to include intra-collegiate athletes (i.e., club sports; Engwall et al., 2004) or are unpublished (NCAA, 2004a; Rockey, 1998).

The NCAA has specific by-laws regarding gambling by student-athletes, and other athletic department and athletic conference personnel. According to by-law 10.3e in the Ethical Conduct section of NCAA Division I Manual, ''student-athletes shall not knowingly participate in any gambling activity that involves intercollegiate athletics or professional athletics'' (p. 53). Violators of this by-law ''shall be ineligible for all regular-season and postseason competition for a minimum of a period of one year'' (NCAA 2004b, p. 54). Furthermore, student-athletes ''who engage in activities designed to influence the outcome of an intercollegiate contest or in an effort to affect win-loss margins...or involves wagering on the student-athlete's institution shall permanently lose all remaining regular-season and postseason eligibility in all sports'' (p. 54). This represents the NCAA's ''zero tolerance'' policy for sports wagering, although other forms of gambling are not explicitly prohibited.

Four studies investigated student-athletes' sports wagering (Cross & Vollano, 1998; Cullen & Latessa, 1996; NCAA, 2004a; Rockey, 1998) and found similar prevalence rates. Cullen and Latessa (1996) found that 29.2% of 648 male football and basketball student-athletes reported wagering on college sports. Cross and Vollano (1998), NCAA (2004a), and Rockey (1998) reported that approximately 28% of student-athletes wagered on sports. The NCAA (2004a) again found significant gender differences with 34.6% of male student-athletes and 5.7% of female student-athletes reporting past year sports wagering.

Present Study

The specific aims of the study were: (1) to replicate previous prevalence work on student-athlete gambling, (2) to examine the prevalence of disordered gambling among student-athletes, (3) to investigate risk factors for gambling behavior and pathology, and (4) to understand the similarities and differences of student-athlete gambling in comparison to a cohort of college students. Improvements over previous studies include strictly defining student-athletes as intercollegiate athletes,

not intra-collegiate athletes (i.e., club sports), assessing gambling at four universities from geographically diverse areas, and utilizing a comparison cohort of students taking psychology course at the same universities. Therefore, in combination with previous studies, this study will improve our understanding of student-athlete gambling and the context in which it takes place.

Method

Participants

Students and student-athletes from four universities were recruited to participate. None of the schools were located in Nevada, the only state with legalized sports wagering. A total of 736 student-athletes competing in 15 NCAA sports and an additional 1,071 non-athlete students from those same universities participated in the study. The four university samples represented diverse geographic regions and collegiate institutions. Data from the four universities were merged together for reasons of institutional confidentiality.

The student-athlete sample was ethnically diverse, consisting of 76.3% Caucasian and 18.9% African-American, and 4.8% Asian, Hispanic, Native American, or unreported ethnicity. Males made up 57.3% of the student-athlete sample, the average age was 19.7 years (SD = 1.4), and monthly income of the sample was \$479 (SD = \$980).

The student sample was also ethnically diverse with 68.7% Caucasian, 25.8% African-American, and 5.5% Asian, Hispanic, Native American, or unreported ethnicity. Males made up 34.1% of the sample, the average age was 20.7 years (SD = 4.8), and monthly income was \$910 (SD = \$1,191). The student-athlete sample was significantly different from the student sample on the demographic characteristics of ethnicity, gender, age, and monthly income ($P < .001$).

Measures

Demographics. Information collected included age, gender, ethnicity, year in school, grade point average (GPA), monthly income, parent gambling, parent history of gambling problem.

South Oaks Gambling Screen (*SOGS*). This self-report measure assessed lifetime problem and pathological gambling and past year gambling behavior (Lesieur & Blume, 1987). Participants who scored 2 or less were classified as non-problem gamblers, participants who scored 3 or 4 were classified as problem gamblers, and participants who scored 5 or higher were classified as pathological gamblers. The SOGS has adequate reliability and validity with good to excellent internal consistency (α = 0.97 and 0.86), adequate test–retest reliability (r = 0.71), and convergent validity (r = 0.86; Lesieur & Blume, 1987; Stinchfield, 2002). The SOGS correlated with DSM-IV diagnostic criteria for pathological gambling in both clinical and general population samples (r = .83 and r = .77 respectively) and had an overall sensitivity of 0.91 and specificity of 0.99 (Stinchfield, 2002).

Gambling Behavior Questions. Participants were asked about prevalence since the start of college for the following items: types of gambling activities engaged in,

whether they gambled with a bookmaker, had been a runner for a bookmaker, or had been a bookmaker. These last three questions were later combined to form one variable, use of a bookmaker.

Procedure

Because of anonymity of responses and the low risks to participants, the Institutional Review Board waived written informed consent. Data collection procedures were identical across the four universities and approximately 20-min was required to complete the questionnaire packet. Participants from the student-athlete sample were recruited in a team setting without the coaching staff present. Research assistants not associated with the athletic department informed the student-athletes about the study and confidentiality. Student-athletes were told that participation was voluntary and no identifying information was to be collected. Participants were given the survey and a manila envelope. Student-athletes were asked to complete the survey, place it in the envelope, seal it, and return it to the research assistant. The response rate was 62.9% of the total number of student-athletes at the four universities.

Participants from the non-athlete student sample were recruited from the psychology classes at the same universities. Since these classes satisfied general education requirements at each university, the sample of students represented a diverse, but not random, sample of each institution's student population. Research assistants informed the students about the study, its purposes, and confidentiality. Students were informed that participation was voluntary and no identifying information was to be collected. Although not quantified, the student sample had very few individuals decline to participate.

Results

Analysis Plan

Information on prevalence and gambling behavior will be presented in terms of percentages or with means and standard deviations where appropriate. Differences between student-athletes and students within gender were evaluated using Chi-squared tests for categorical data and ANOVA for continuous data. A series of hierarchical regression models were conducted to examine risk factors for gambling behavior and disordered gambling. Demographic variables were entered as covariates, and results are reported as odds ratios (OR).

Logistic regression was used for dichotomous dependent variables (e.g., gambling, sports wagering, use of a bookmaker). Ordinal logistic regression was used for variables that had more than two ordered levels (e.g., disordered gambling). Poisson regression was used for variables that represented count data (e.g., gambling frequency) as the distribution within these variables is typically skewed and residual errors are often not normally distributed. As Poisson regression is prone to extra dispersion, this was assessed and corrected for following McCullagh & Nelder's procedure as needed (Allison, 1999).

In the regression analyses all non-significant interactions and main effects were eliminated and a simplified model containing only significant interactions and main

effects was presented. We assessed each continuous variable (e.g., income) using both a linear and a quadratic term to allow the relationship between any given continuous predictor and gambling status to be non-linear, if the data supported it. Analyses involving logistic regression and Poisson regression were conducted with SAS® and all other analyses were conducted with SPSS®.

Missing Data

The survey was completed confidentially, so it was not unusual for participants to skip some of the questions. Out of the 1,833 students who completed the survey, 66% (n = 1,215) had complete data on all seven covariates (i.e., gender, ethnicity, income, year in school, GPA, and parental history of gambling problem). Almost 19% did not report their monthly income and approximately 14% did not indicate their current GPA. For all other covariates missing data was minimal (i.e., less then 4%). Further examination indicated that the high percentage of missing data for GPA was a consequence of freshman that had not yet completed a full semester of college. This pattern of data leads to potential systematic bias. Therefore, analyses were conducted first with all covariates including only students who completed a year or more of college (n = 921) and second on the entire sample but excluding GPA as a potential covariate. Given the multiple tests, we employed a P value of less than or equal to 0.01 as the criterion for significance in all regression analyses.

The results of the analyses examining upperclassman with all covariates, and analyses examining students of all years but excluding GPA were similar. Since GPA was not significant in any of the analyses, we reported on the data from the full sample as these analyses have more participants and thus more power for detecting effects. Furthermore, these analyses allow us to understand the gambling and gambling-related behaviors for all participants.

Prevalence Rates of Gambling Behavior

The prevalence rates for gambling participation since the start of college and past year gambling participation were almost identical. For both, gambling since the start of college and gambling in the past year, the prevalence rate for male student-athletes was 75%. This prevalence rate was significantly higher than that for males in the general student population (66% reported gambling since the start of college, $\chi^2(1,\ n = 767) = 6.6,\ P < .01$; 65% reported gambling in the past year, $\chi^2(1,\ n = 735) = 7.8,\ P < .01$). Female student-athletes were not significantly different from female college students, 55% of all women gambled since the start of college, $\chi^2(1, n = 1{,}014) = 3.3, P > .05$, and 52% of all women gambled in the past year, $\chi^2(1,\ n = 967) = 3.6,\ P > .05$.

Within gender, no differences were noted between student-athletes and students for the prevalence of sports wagering since the start of college. Approximately 20% of males reported wagering on sports, $\chi^2(1,\ n = 732) = 3.6,\ P > .05$, and 4% of females reported wagering on sports, $\chi^2(1,\ n = 975) = 0.4,\ P > .05$. For use of a bookmaker, no differences were noted in the prevalence rate between student-athletes and students within gender. Approximately 6% of males, $\chi^2(1,\ n = 746) = 0.4,\ P > .05$, and less than 1% of females, $\chi^2(1, n = 985) = 2.3, P > .05$ reported use of a bookmaker.

Past Year Gambling Behavior

Student-athletes were not significantly different from non-athlete students in terms of past year gambling frequency, $F(1,1698) = 0.85$, $P > .05$. Significant gender differences were found with males gambling 12.7 times ($SD = 37.6$) in the past year and females gambling 3.6 times ($SD = 14.9$), $F(1,1698) = 43.65$, $P < .001$. No significant differences were noted for average length of gambling session, $F(3,1004) = 1.47$, $P > .05$, which was 2.7 h ($SD = 6.8$) for the entire sample. Gambling behaviors involving money (e.g., largest bet) were not reported here as monthly income was significantly related to these variables and was better presented with regression analyses.

Prevalence of Disordered Gambling

The prevalence of lifetime disordered gambling differed by gender but not by athletic status. Male student-athletes were not significantly different than male students with 88.1% non-problem, 6.5% problem gamblers, and 5.4% pathological gamblers, $\chi^2(2, n = 754) = 1.5$, $P > .05$. Female student-athletes were not significantly different than female students with 96.4% non-problem, 2.1% problem gamblers, and 1.4% pathological gamblers, $\chi^2(2, n = 983) = 4.7$, $P > .05$.

Since the SOGS assessed lifetime prevalence the possibility remains that many of these individuals identified as problem or pathological gamblers could be no longer experiencing gambling problems. ANOVA with follow-up posthoc testing was used to investigate past year gambling frequency by SOGS category and gender. Consistent with the SOGS classification system, the groups differed significantly on past year gambling frequency. Table 1 displays mean past year gambling frequency by SOGS category. A main effect for gender was also found with males, $P < .001$ (data not shown). No significant interaction was found between gender and SOGS category, $P > .05$. Further analysis of gambling frequency found 10.3% of the disordered gamblers in the sample reported being abstinent from gambling in the past year.

Gambling Risk Factors

Regression was utilized to investigate risk factors of gambling behavior and pathology. As shown in Table 2, gambling prevalence since the start of college was significantly related to athletic status, gender, ethnicity, and year in college. None of the interactions between athletic status and any covariate were significant. Student-athletes were more likely to gamble than students, males were more likely to gamble then females, and Caucasians were more likely to gamble than African-Americans.

Table 1 Past year gambling frequency by lifetime SOGS category

Lifetime SOGS category	Past year gambling frequency	Statistic (df)	*P*-value
Non-problem gambler	5.8 (22.7)	$F(2, 1662) = 27.22$	<.001
Problem gambler[a]	25.5 (41.5)		
Pathological gambler[a]	37.4 (76.0)		

Note: [a] Significantly different than non-problem gamblers; SOGS, South Oaks Gambling Screen

Table 2 Logistic regression: significant odds ratios associated with gambling prevalence

Variable	Gambling prevalence since the start of college	Sports wagering since the start of college	Involvement with a bookmaker
n	1,431	1,376	1,391
Student athlete	1.48*	0.59*	–
Sex	1.75***	7.14***	100.00***
Year in school	1.48***	1.29***	1.44**
Parental gambling	–	–	5.46**
Problem history			
Ethnicity			
Caucasian	–	–	–
African-American	0.48***	–	–
Other	0.52	–	–
Monthly income	–	–	–

Note: Reference groups: students, females, freshmen, positive parental history, and Caucasians; Odds ratio for monthly income indicates change of 1 SD ($1,130)

* $P < .01$; ** $P < .001$; *** $P < .0001$

Participants with more time in college were more likely to have gambled and there was a trend for participants with higher incomes to gamble more.

Past year gambling analyses were performed only on participants who reported any gambling in the past year ($n = 1{,}033$) and had complete data on all the covariates ($n = 870$). Table 3 provides the final models for gambling behaviors. Gender was the only variable significantly related to past year gambling frequency, males reported gambling more often than females in the past year. The largest amount wagered in a single day was significantly related to athletic status, gender, and monthly income. Student-athletes wagered less than students, males wagered more than females, and those with higher incomes reported higher wagers than those with lower incomes.

The largest single bet had only two significant variables: athletic status and gender. Student-athletes largest bet was less than students and males largest bet was more than females. Sex, monthly income, ethnicity, and year in school were significant

Table 3 Poisson regression: significant odds ratios associated with past year gambling behaviors

Variable	Gambling frequency	Largest amount wagered in 1 day	Largest single bet	Largest loss-in 1 day
n	870	861	823	840
Student athlete	–	0.50*	0.39*	–
Sex	3.03***	1.92*	2.50*	100.00***
Year in school	–	—	—	1.30***
Parental gambling				
Problem history	–	–	–	–
Ethnicity				
Caucasian	–	–	–	–
African-American	–	–	–	1.43
Other	–	–	–	2.86**
Monthly income	–	1.25***	–	1.12*

Note: Reference groups: students, females, freshmen, positive parental history, and Caucasians; Odds ratio for monthly income indicates change of 1 SD ($1,130)

*$P < .01$; ** $P < .001$; *** $P < .0001$

for largest 1-day loss. Males and those with higher income had larger losses. Caucasians reported greater one-day losses than Non-African-American minorities, and students with more time in college lost more than those in lower grades. Average length of gambling session was not significantly related to athletic status or any of the covariates, $P > .01$.

Sports wagering since the start of college was not related to athletic status in the initial model. As shown in Table 2, gender and year in school were significantly related to sports wagering. Males were more likely to wager on sports than females and students with more years in college were more likely to wager on sports than students with less college experience. However, once these covariates were entered into the model, athletic status became significant with student-athletes wagering less on sports than students. Use of a bookmaker was not significantly related to athletic status. Gender, year in school, and parents gambling problem were all significantly related to use of a bookmaker (See Table 1). Males, older students, and students with a parent(s) gambling problem were more likely to use a bookmaker. None of the interactions were significant for sports wagering or use of a bookmaker.

Disordered gambling category (i.e., SOGS Scores ≤2, 3–4, ≥5) was significantly related to gender and parent(s)' history of a gambling problem (n = 1,394). Males were 5.26 times as likely to be in a higher pathology group than females, $P < .0001$, and individuals who reported a parent with a gambling problem were 5.27 times as likely to be in a higher disordered gambling group, $P < .0001$. No other demographic variables, including athletic status, were significantly related to disordered gambling category.

Discussion

This study found that a majority of student-athletes were gambling, with a minority gambling in violation of NCAA by-laws, and a significant proportion were experiencing harmful consequences related to their gambling. These findings are consistent with previous research (Cross & Vollano, 1998; Cullen & Latessa, 1996; Engwall et al., 2004; NCAA, 2004a; Rockey, 1998). With the inclusion of a student cohort from the same institutions, we found with few exceptions, student-athletes' gambling to be very similar to their non-athlete student peers; thus, supporting the notion that gambling is a university wide phenomenon in which student-athletes require supplementary attention due the potential harm to intercollegiate athletics.

After accounting for demographic variables, prevalence of gambling since the start of college was the only area in which student-athletes exceeded students. Student-athletes were approximately 1.5 times more likely than students to engage in some form of gambling since the start of college. The elevated prevalence rate may be explained by studies that have found student-athletes as a group engage in more risk-taking activities than the general student population (Cross, Basten, & Hendrick, 1998; Nattiv & Puffer, 1991; Weiss, 1999).

Student-athletes were less involved with gambling than students in only three instances. After accounting for demographic variables, student-athletes wagered less money over a single episode, reported smaller largest bet, and were less likely than students to report sports wagering. Two possible explanations for student-athletes' lower sports wagering prevalence were that (1) student-athletes were complying, to

some extent, with NCAA rules or that (2) student-athletes were aware of NCAA rules and subsequently under-reported this behavior to avoid admitting violations of NCAA rules. Steps were taken to provide participants with anonymity and confidentiality to encourage honest responses. These steps included collecting no identifying information, requiring athletic department personnel to be absent during the completion of surveys, and giving student-athletes envelopes in which they sealed completed surveys.

There were many similarities in the gambling behaviors of student-athletes and students. However, one alarming similarity was that 6% of males and 1% of females reported use of a bookmaker. This finding included students who endorsed the following items: wagered with a bookmaker, served as a ''runner'' for a bookmaker, and/or were a bookmaker. Three risk factors were identified for use of a bookmaker: being male, being an upperclassman, and reporting a family history of gambling problems. Anecdotal evidence highlights the potential ramifications of this NCAA violation for student-athletes as two recent point shaving scandals found that the student-athletes were involved with bookmakers (Barr et al., 1998).

Another alarming similarity was the lifetime prevalence rate of disordered gambling, with 12% of males and almost 4% of females classified as disordered gamblers. Moreover, most of these individuals reported gambling frequently within the past year. These prevalence rates were consistent with meta-analytic findings for college students (Shaffer et al., 1999). Many adverse consequences are associated with disordered gambling including social, legal, and financial difficulties (National Research Council, 1999). Being male and reporting at least one parent with a history of gambling problems were significant risk factors for lifetime disordered gambling.

Both use of a bookmaker and disordered gambling have significant implications for universities and the NCAA. It should be noted that the NCAA's educational prevention initiative, ''Don't Bet On It,'' appears to be having a positive effect on student-athletes' sports wagering as indicated by the lower prevalence rate than non-athlete students. Unfortunately, the effectiveness of this program has not been empirical tested. Moreover, significant problems related to gambling that impact student-athletes and the health and integrity of intercollegiate sports remains. Evidence from this and other studies suggest a significant proportion of student-athletes are disordered gamblers.

The NCAA should not be the only concerned party about student-athlete gambling. Universities need also to be concerned *and* involved as these individuals have the potential to harm the reputation, athletic program, and finances of these institutions. However, providing prevention and intervention efforts to all student-athletes that goes beyond the current ''Don't Bet On It'' program would be a costly endeavor. An indicative prevention program, targeting those who are at increased risk (i.e., males, family history of gambling problems, and gambling frequently), is suggested as it offers a more cost effective model.

Research on other addictive behaviors, such as alcohol consumption, provides compelling evidence that brief indicative prevention and/or intervention is effective with college students (Dimeff, Baer, Kivlahan, & Marlatt, 1999; Miller, 2000) with cognitive behavioral and motivational enhancement programs receiving the most support (Larimer & Cronce, 2002). Although not yet empirically tested, it is logical to believe that prevention of and treatment for disordered gambling in student-athletes can be an effective protective measure and could be combined with other prevention efforts due to common risk factors with other high-risk behaviors

(e.g., alcohol consumption and drug use; Dickson, Derevensky, & Gupta, 2004). Moreover, these efforts might be best situated within university-wide prevention and intervention system due the findings that students and student-athletes were highly similar to each other.

The present study has several strengths. First, four diverse universities participated in the study increasing generalizability of the findings. Second, a cohort of students at those same universities participated allowing for comparisons between student-athletes and their non-athlete peers. Third, the study utilized a psychometrically supported assessment instrument for disordered gambling. Finally, several steps were taken to ensure participant confidentiality.

This study also had limitations. It would be naïve to believe that under-reporting of behavior that required acknowledgment of NCAA violations by student-athletes may not have occurred. The steps we took to ensure confidentiality may not have been enough to guarantee truthful answers. Missing data was another limitation of the study with as many as a third of the participants excluded because of their omissions on some measures. Our analysis plan sought to rectify the problem, especially with first semester freshmen and their lack of GPA. Future studies involving first semester college freshman should ask for high school GPA as a proxy. Lastly, due to limitations in survey length we used a lifetime measure of pathological gambling which prohibited estimation of past year prevalence. The lifetime measure generated a sample of at risk students and student-athletes, many of who were gambling heavily. Studies involving college students have shown that gambling more than once per month was highly related to past year pathological gambling status (Weinstock, Whelan, & Meyers, 2004, in press) and the lifetime disordered gamblers in this sample were gambling frequently.

In summary, student-athlete gambling, while unique with its prohibitions and implications related to the integrity of intercollegiate sports, is likely best understood as part of the broader context of being a college student. Student-athletes, like their college student peers, gamble at a significant rate and feature several associated demographic characteristics including being male, of a Caucasian background, having a higher monthly income, and being in school longer. Efforts by the NCAA to combat gambling associated violations appear to have a positive effect on student-athletes' prevalence of sports wagering while having little impact on involvement with a bookmaker. Disordered gambling remains a problem for both students and student-athletes, calling for the exploration of indicative prevention and intervention strategies need to be explored to protect everyone involved and the integrity of intercollegiate athletics.

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