Investigating Risk Factors Predictive of Problem Outcomes Experienced by First Year Drinking and Non-Drinking Collegiate Student-Athletes.

By: David L. Wyrick, Jeffrey J. Milroy, Erin J. Reifsteck, Kelly L. Rulison, William N. Dudley

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Abstract:

This study examined risk factors for problem outcomes experienced by drinking and non-drinking first year collegiate student-athletes. Freshman and transfer student-athletes (N=2956) reported their alcohol use, problems experienced and demographic/sport-related data via an online survey. We hypothesized extreme drinking, male, out-of-season, team sport and Division III would significantly predict experiencing more alcohol, sport and other-related problem outcomes. Results suggest that out-of-season, team sport and light, heavy or extreme drinking (versus non-drinking) student-athletes were more likely to report alcohol-related problems. Female and in-season student-athletes were more likely to experience sport-related problems. Other problem outcomes were more likely to be experienced by heavy and extreme drinkers but not light drinkers. Findings should guide prevention programming that targets high-risk student-athlete groups.

Keywords: college | student-athlete | alcohol use | consequences | problem outcomes | first-year students

Article:

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Investigating Risk Factors Predictive of Problem Outcomes Experienced by First Year Drinking and Non-Drinking Collegiate Student-Athletes

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ABSTRACT

This study examined risk factors for problem outcomes experienced by drinking and non-drinking first year collegiate student-athletes. Freshman and transfer student-athletes (N=2956) reported their alcohol use, problems experienced and demographic/sport-related data via an online survey. We hypothesized extreme drinking, male, out-of-season, team sport and Division III would significantly predict experiencing more alcohol, sport and other-related problem outcomes. Results suggest that out-of-season, team sport and light, heavy or extreme drinking (versus non-drinking) student-athletes were more likely to report alcohol-related problems. Female and in-season student-athletes were more likely to experience sport-related problems. Other problem outcomes were more likely to be experienced by heavy and extreme drinkers but not light drinkers. Findings should guide prevention programming that targets high-risk student-athlete groups.

Key phrases: college, student-athlete, alcohol use, consequences, problem outcomes, first-year students

Alcohol consumption cost the United States an estimated total of $223.5 billion in 2006 (Bouchery et al., 2011). A major contributor to this cost was risky drinking among college students (Substance Abuse and Mental Health Services Administration, 2013). Student-athletes have been characterized as a sub-group of college students that engages in particularly high rates of risky drinking (Green et al., 2014; Martens et al., 2006; Yusko et al., 2008). Specifically, student-athletes are more likely to engage in heavy episodic drinking (i.e., 5+ drinks for men, 4+ drinks for women) and extreme drinking (i.e., 10 or more drinks on one occasion (White et al., 2006) (Green et al., 2014; Martens et al., 2006; Yusko et al., 2008). Given the established link between higher rates of drinking and increased negative consequences (Grossbard et al., 2009; Martens et al., 2006; Patrick et al., 2016; Wechsler et al., 1997), it is not surprising that compared to non-athletes, student-athletes experience more negative consequences related to their alcohol use (Leichliter et al., 1998; Nelson & Wechsler, 2001; Turrisi, 2006; Wahesh et al., 2013). It is unclear, however, what specific level of drinking among first year student-athletes increases the likelihood of experiencing problem outcomes. Additionally, it is unclear whether specific demographic and sport-related risk factors (e.g., gender, race, team vs. individual sport, season status and NCAA division) are also predictive of experiencing problem outcomes.

While college students who drink more also generally experience more negative consequences (e.g., Leichliter et al., 1998; Perkins, 2002; Wechsler, et al., 2002; Park, 2004; Lawrence et al., 2012), additional research is needed to investigate whether specific groups of first year student-athletes are particularly susceptible to problem outcomes associated with their alcohol use. Identifying the specific factors that may put first year student-athletes at increased risk for experiencing problem outcomes can ultimately inform future research as well as the development of more effective interventions (Martens et al., 2006; Turrisi et al., 2006).

Past studies have found differences in *alcohol use* among groups of first year student-athletes (Doumas & Midgett, 2002; Surujlal & Keyser, 2014; Barry, et al., 2015); thus, there is a potential that *problem outcomes* associated with drinking also differ between these groups. For example, White/Caucasian student-athletes tend to drink at higher rates than African American

student-athletes (NCAA, 2012). Furthermore, 44% of male student-athletes report heavy drinking, compared to only a third of female student-athletes (NCAA, 2014). This difference is even greater for extreme drinking: male student-athletes are six times more likely to engage in extreme drinking compared to female student-athletes (18% vs. 3%). These findings suggest that White/Caucasian first year student-athletes and male first year student-athletes might be at higher risk for experiencing alcohol-related problems.

Alcohol use among first year student-athletes also varies based on sport-related factors such as season, competition division and whether the first year student-athlete is participating in a team or individual sport (Ford, 2007; Martens et al., 2006; Martin, 1998; Partington et al., 2013). For example, student-athletes tend to drink at higher rates during the off-season compared to in-season (Martens et al., 2006; NCAA, 2014), and alcohol consumption is greatest among Division III student-athletes (Green et al., 2001; NCAA, 2014). In addition, first year student-athletes may be motivated to consume alcohol as an avenue for enhancing team cohesion or to conform to team norms (Ford, 2007). Zhou, Heim, & Levy (2016) suggested that sport-related drinking may be an avenue for building group identification, which may be particularly relevant for first year student-athletes as they assimilate to a new team. Because off-season, Division III, and student-athletes who play team sports are more likely to use alcohol, they may also be more likely to experience alcohol-related problem outcomes. Existing literature investigating the relationships among alcohol use and negative consequences has focused on problems that participants specifically self-attribute as being a result of their alcohol consumption. Thus, the nature by which survey questions are often posed requires the respondent attribute any problem they experience as resulting from their alcohol use. Posing questions in this way presumes that respondents are accurately attributing these problems to their alcohol use, which may be logical when considering problems that are clearly dependent on consuming alcohol (e.g., driving while intoxicated, experiencing a hangover) but may be less obvious for other reported problems (e.g., showing up late for practice, missing a class, engaging in risky sexual behavior). Examining different types of problems separately (i.e., alcohol-specific consequences, sport-related consequences and other consequences) that are not self-attributed to alcohol use may better elucidate the potential relationships between alco-

hol use and negative consequences. Furthermore, research has excluded relevant data on the experiences of negative problems among non-drinkers.

To more clearly explicate these relationships, the present study examines how often first year student-athletes experience different types of problems – regardless of their self-reported alcohol use and without requiring first year student-athletes to attribute those problems to alcohol. Such comparisons will help to more precisely determine what factors, and most importantly, what level of alcohol use (none vs. light, heavy and extreme), predict a greater number of problem outcomes experienced. Clarifying the relationships among alcohol use, problem outcomes and related risk factors can help identify first year student-athletes most at-risk for these concerns in order to inform effective prevention efforts targeted toward first year student-athletes.

The purpose of the present study was to test the extent to which various risk factors predict the frequency of problems experienced by first year collegiate student-athletes. This study extends previous research by separately examining alcohol, sport and other problems. In particular, we were interested in identifying whether differing levels of drinking, compared to not drinking, significantly predict experiencing a greater number of various problem outcomes. We hypothesized that male, out-of-season, team sport, Division III and higher alcohol use – especially extreme drinking – would significantly predict more alcohol-related, sport-related and other problem outcomes.

METHODS

In the spring semester of 2013, and following institutional review board approval, the research team recruited 47 NCAA member institutions from Divisions I (39.6%), II (32.5%), and III (27.9%) to participate in a larger study of *myPlaybook*, a web-based alcohol and other drugs prevention program for first year student-athletes. As part of this larger study, freshmen and transfer (i.e., new to the institution) first year student-athletes at each participating institution completed surveys prior to completing *myPlaybook*; we focus on this pretest survey data in the present article. Research staff emailed all freshmen and transfer first year student-athletes (N= 5,131) at each institution inviting them to

participate in the study. Five days later, these first year student-athletes received an email that included log-in information to a learning management system that gave students access to *myPlaybook* and all related surveys. We used a password protected web-based data collection service housed on a secure server to collect survey responses. All participants provided online informed consent before accessing the survey and could stop participating at any time. The informed consent instructed first year student-athletes who were under 18 years of age to opt-out of completing the survey.

PARTICIPANTS

A total of 3276 of the recruited participants (63.8%) completed the pretest survey (Table 1). The final sample size following data screening and removal of extreme or improbable cases was $N = 2956$. The sample included similar numbers of male (47.6%) and female (52.4%) first year student-athletes. Most participants identified themselves as White (79.7%) or Black or African-American (11.5%). For analyses, those who identified as Asian (2%), Hawaiian/Pacific Islander (0.8%), American Indian or Alaskan Native (0.7%), Other (0.5%), or 2 or more races (4.8%) were combined into a single "Other" (8.5%) category. The majority of participants were either 18 (42%) or 19 (43%) years old, with the remaining participants between 20 and 25 years old. In-season and out-of-season student-athletes were represented (56.5% and 43.5%, respectively).

MEASURES

Alcohol Use. First year student-athletes reported whether they had consumed any alcohol (i.e., one drink is equal to a 12-ounce bottle or can of beer, a 5-ounce glass of wine, 12-ounce bottle of wine cooler or 1.5-ounce liquor) in the last 2 weeks. Past two week alcohol use and frequency are a standard method for eliciting alcohol use behaviors data from college students. Next, first year student-athletes who reported any alcohol use in the past two weeks reported the number of drinks they consumed on each day during the past two weeks. Based on their responses to these questions, we calculated four levels of alcohol use: *non-drinkers*

TABLE 1

Participant demographics

	Total Sample	
Demographic	*n*	*%*
Gender		
Male	1408	47.6
Female	1548	52.4
Race		
White	2356	79.7
Black or African American	340	11.5
Two or More Races	142	4.8
Asian	59	2.0
Hawaiian or Pacific Islander	24	0.8
American Indian or Alaskan Native	21	0.7
Other	14	0.5
Season Status		
In-season	1670	56.5
Out-of-Season	1286	43.5
Athletic Division		
Division I	1162	39.3
Division II	922	31.2
Division III	872	29.5
Total	2956	

two weeks but no days with heavy drinking; *heavy drinkers* = 1 or 2 days of heavy drinking in the past two weeks (defined by 5+ = 0 drinks in the past two weeks; *light drinkers* = drank in the past drinks for men or 4+ drinks for women); *extreme drinkers* = 3 or more days of heavy drinking in the past two weeks or at least one day of extreme drinking, defined as 10+ drinks in one day. These categorizations were determined using guidance from National Institute on Alcohol Abuse and Alcoholism's (NIAAA) calculations of both amount and frequency of use (NIAAA, 2014). Importantly, these groups were created to determine the predictive nature of each categorization and assess what level might result in the greatest increase in experienced problems. Based on these classifications, 71% (*N*=2099) were currently non-drinkers,

11.9% (*N*= 352) were light drinkers, 9.4% (N=277) were heavy drinkers, and 7.7% (N=228) were extreme drinkers.

Problem Outcomes. A 17-item index was used to assess problem outcomes. Items were adapted from the Rutgers Alcohol Problem Index (White & Labouvie, 2000), the Harvard College Alcohol Survey (Wechsler et al., 2002), and the 2009 Survey of Substance Use Trends among NCAA College Student-Athletes. Students were asked, "In the past 30 days, how many times have you experienced the following?" Problem outcomes were then grouped into the following categories: *Alcohol-related Problems* (e.g., had a hangover, blacked out); *Sport-related Problems* (e.g., felt sluggish in a game; was late to a practice); *Other Problems* (e.g., performed poorly on a test; missed a class). Possible response options included: 0 = "None", 1 = "Once"; 2 = "Twice"; 3 = "3 times"; 4 = "4 - 6 times", and 5 = "7 or more times." Alcohol-related Problems were computed by averaging across four alcohol-related problems items. Scores ranged from 0 to 5.17 and were skewed to the right with a mean of .11. Sports-related Problems were computed by averaging across six sports-related problems. Scores ranged from 0 to 5.25 and were skewed to the right with a mean of .67. Other Problems were computed by averaging across 4 other problems. Scores ranged from 0 to 3.14 and were skewed to the right with a mean of .28. Internal consistencies were low to moderate for Alcohol-related, Sports-related, and Other Problems (α = .47, .74, and .22 respectively). The low internal consistencies are due to both conceptual and distributional reasons. First, it should be recognized that the scores do not comprise latent variables but rather an index. As Bollen and Lennox (1991) point out, measures of internal consistency which are based on inter-item correlations may not be high for items which are used to compute an index. Additionally, the distribution of responses on the items was highly skewed, thus constraining the correlation among the items, which leads to low Cronbach's alpha values.

Demographic and Sport-related risk factors. Students identified their gender, race and whether they were currently in-season or out-of-season. Students also reported what sport they currently participated in, which we then classified into "team sport" (e.g., soccer, basketball and hockey) or "individual sport" (e.g., diving, rifle, tennis). Lastly, first year student-athletes were asked to select the school they were currently attending and this informa-

tion was subsequently used to identify participants as a Division I, II, or III first year student-athlete.

Data Preparation and Analyses

To investigate the main research question, demographic and sport-related risk factors (i.e., gender, race, division, season, team vs. individual sport) and alcohol use (i.e., nondrinkers, light drinkers, heavy drinkers and extreme drinkers) were entered in multiple regression models as dummy coded predictors of the frequency of reported alcohol-related problems, sport-related problems and other problems.

Data were analyzed using hierarchical multiple regression models with a block entry method for each outcome. Given the strong positive skew in the outcome variables, outcomes were first transformed using the natural log transformation. Second, we used bootstrapping methods within SPSS 22. Bootstrapping can provide accurate results when the distributional assumptions of normal theory statistical tests are not tenable (Fox, 2008). Employing this method provides greater stability of the research results, which is particularly beneficial given the non-normal distributions of problem outcomes. In order to obtain stable results, we obtained 5000 replications of the bootstrapped sample. In this analytical approach, interpretation of statistical significance is based on the bootstrapped 95% confidence intervals which are provided for each term in the model. The null hypothesis was rejected if the confidence intervals did not contain zero. Regression coefficients and p-values are also provided in the results that follow.

RESULTS

Mean problem outcomes reported across the demographic-, sport-, and drinking-related variables are presented in Table 2. Detailed results from each regression model for the three categories of problems are provided in Table 3.

TABLE 2

Mean Number of Problems Experienced across Demographic-, Sport-, and Drinking-Related Variables

Category	Alcohol-related Problems *M (SD)*	Sport-related Problems *M (SD)*	Other-related Problems *M (SD)*
Male	.130 (.361)	.593 (.726)	.303 (.368)
Female	.086 (.243)	.746 (.783)	.261 (.323)
White	11.8 (.314)	.656 (.729)	.275 (.343)
Black	.068 (.218)	.698 (.892)	.320 (.362)
Other Race	.085 (.310)	.737 (.805)	.284 (.348)
Team Sport	.123 (.330)	.629 (.746)	.258 (.300)
Individual Sport	.072 (.240)	.770 (.783)	.292 (.364)
In-Season	.080 (.240)	.800 (.813)	.264 (.325)
Out-of-Season	.141 (.370)	.519 (.655)	.302 (.370)
Division I	.100 (.289)	.799 (.830)	.277 (.346)
Division II	.103 (.324)	.620 (.702)	.272 (.346)
Division III	.122 (.305)	.555 (.694)	.297 (.345)
Non-Drinker	.031 (.196)	.721 (.811)	.255 (.328)
Light Drinker	.136 (.249)	.557 (.626)	.261 (.273)
Heavy Drinker	.266 (.339)	.580 (.573)	.341 (.377)
Extreme Drinker	.500 (.630)	.522 (.600)	.479 (.477)

TABLE 3

Results of Regression Analysis by Outcome

	Alcohol-related Problems				Sport-related Problems				Other-related Problems			
Variable	B(β)	Sig.	Lower	Upper	B(β)	Sig.	Lower	Upper	B(β)	Sig.	Lower	Upper
Female	-.007(-.18)	.296	-.019	.005	**.068(.089)**	**.001**	**.041**	**.096**	-.014(-.030)	.083	-.029	.002
African American	-.003(-.005)	.748	-.019	.015	.011(.009)	.633	-.035	.057	**.047(.062)**	**.002**	**.018**	**.072**
Other	-.003(- .006)	.706	-.018	.014	.024(.023)	.217	-.014	.062	.017(.027)	.144	-.005	.041
In-Season	**-.015(-.038)**	**.025**	**-.028**	**-.002**	**.125(.160)**	**.001**	**.096**	**.153**	-.008(-.019)	.305	-.025	.007
Team Sport	**.021(.051)**	**.003**	**.008**	**.032**	-.030(-.036)	.052	-.060	.000	.009(.019)	.297	-.008	.027
Division II	.003(.008)	.658	-.011	.018	**-.074(-.090)**	**.001**	**-.107**	**-.042**	-.003(-.007)	.762	-.022	.014
Division III	.004(010)	.579	-.010	.018	**-.102(-.119)**	**.001**	**-.136**	**-.068**	.013(.027)	.217	-.007	.034
Light Drinker	**.078(.135)**	**.001**	**.060**	**.098**	**-.063(-.053)**	**.003**	**-.106**	**-.021**	.013(.019)	.242	-.009	.036
Heavy Drinker	**.174(.270)**	**.001**	**.148**	**.201**	-.039(-.029)	.110	-.086	.009	**.063(.082)**	**.001**	**.032**	**.095**
Extreme Drinker	**.307(.436)**	**.001**	**.262**	**.355**	-.051(-.035)	.053	-.104	.001	**.146(.172)**	**.001**	**.110**	**.186**

Note: Non-Drinker used as referent group for Light, Heavy, and Extreme Drinker. Bold text indicates significant at <.05

Alcohol-related problems

The alcohol-related problems model explained the most amount of variance in reported problems with an R^2 of .254 (R^2_{adj} = .251). Participating in a team sport was positively associated with alcohol-related problems, whereas in-season status was negatively associated with alcohol-related problems. Light drinkers, heavy drinkers and extreme drinkers all reported significantly more alcohol-related problems than non-drinkers.

Sport-related problems

The regression model for sport-related problems had an R^2 of .068 (R^2_{adj} = .065). Results indicate that female first year student-athletes and individuals who were currently in-season were more likely to report higher sport-related problems. Light drinkers reported significantly fewer sport-related problems than non-drinkers. Divisions II and III first year student-athletes were less likely to report sport-related problems compared to Division I first year student-athletes.

Other problems

Lastly, the regression model for other problems had an R^2 of .040 (R^2_{adj} = .037). Compared to White first year student-athletes, African American first year student-athletes were more likely to report other problems. Heavy and extreme drinkers were also more likely than non-drinkers to report experiencing these problems, but there were no differences between light drinkers and non-drinkers.

DISCUSSION

The purpose of the present study was to investigate the extent to which demographic, sport and drinking-related risk factors predict various problems experienced by collegiate first year student-athletes. Specifically, we sought to extend previous research by evaluating different types of negative outcomes experienced by first year student-athletes, as well as more precisely determine what level of drinking predicts significantly greater problems. Problem outcomes were organized into three categories: alcohol-related, sport-related and other problems. Within each model,

we were particularly interested in the comparison between drinkers and non-drinkers. We hypothesized that males, out-of-season, team, Division III and extreme drinking would be most predictive of greater alcohol, sport and other problem outcomes.

Confirming hypothesized relationships, first year student-athletes who were out-of-season, as well as those who participated in team sports, reported more alcohol-related problems. Findings related to season status are not surprising considering student-athletes typically drink more during the off-season (NCAA, 2014) when they are less likely to be practicing and competing as frequently. Additionally, athletes are more likely to consume alcohol when their teammates engage in high alcohol use (Vest & Simpkins, 2013), and findings from the present study suggest that participating in team sports may also result in experiencing more alcohol-related problems.

As shown by the average reported alcohol-related problems as a function of alcohol use, there was a near linear pattern observed across light to extreme drinkers, with higher levels of drinking showing increased alcohol-related problems over non-drinkers. Light drinkers were more likely than non-drinkers to experience alcohol-related problems. Thus, even a small increase in alcohol consumption levels may put first year student-athletes at greater risk for experiencing problem outcomes related to their alcohol use. While a harm reduction approach appears to be a more effective strategy than an abstinence-only approach to alcohol prevention efforts among this group (Marlatt, et al., 1993), it is important to note that refraining from consuming any alcohol does appear to mitigate problems experienced.

Although being in-season seems to be a protective factor against the experience of alcohol-related problems, it is important to note that in-season first year student-athletes do still experience some alcohol-related problems (see Table 2). Previous literature suggests that first year student-athletes who drink at extreme levels report consistent alcohol use regardless of season (Wahesh et al., 2013). Thus, extreme drinkers, who on average reported the most alcohol-related problems in the current sample, may be likely to experience these problems even when participating in their competitive season. Current findings confirm the hypothesis that drinking alcohol at extreme levels may put first year student-athletes at a particularly high risk for experiencing

problems. Similarly, Jackson (2006) found that consuming ten or more drinks was most predictive of negative outcomes such as experiencing a hangover, and higher rates of drinking predicted more severe outcomes. More effective interventions that target extreme drinkers who are at the highest risk for alcohol-related problems are needed— especially given that almost 1 in 5 NCAA male student-athletes report drinking at an extreme level (NCAA, 2014).

In contrast to our hypotheses with regard to sport-related problems, female first year student-athletes and first year student-athletes who were in-season actually reported more sport-related problems. It is possible that in-season first year student-athletes were more likely to report experiencing sport-related problems in part because they are likely to be the most involved with their sport during a competitive season and thus have greater opportunity to experience such problems. Similarly, Division II and Division III first year student-athletes both showed decreased sport-related problems over Division I, which may be due in part to greater competition and practice hours that characterize Division I participation, thus providing more opportunities for Division I first year student-athletes to experience sport-related problems.

The fact that female first year student-athletes reported experiencing more sport-related problems is surprising. Data collected during this study provide no evidence as to why female first year student-athletes might experience more sport-related problems, and future research is needed in order to better understand this potential difference. Unexpectedly, results suggest that there was a negative relationship between drinking and sport-related problems. This negative relationship rose to the level of statistical significance only in the light versus non-drinkers. That is, light drinkers had fewer sport-related problems when compared to non-drinkers. However, the standardized coefficient for this effect was very small, and additional research is needed to explore the veracity of this finding.

In examining other types of problems, increases in these problem outcomes were related to heavy and extreme drinking, but not light drinking, when compared to non-drinkers. Thus, these problems appear to increase the most when first year student-athletes go from occasional drinking to more heavy drinking, and again when they go from heavy drinking to extreme drinking,

which further confirms research by Jackson (2006). Behavioral interventions aiming to reduce problem outcomes should include specific approaches that target first year student-athletes who engage in heavy and extreme drinking. Among the other predictor variables, only African Americans were significantly likely to report higher levels of these other types of problems. This finding seems to be inconsistent with other literature that indicates African American college students drink less than White college students and thus might logically experience fewer problems. However, results of this study may reflect unique challenges that African American college students face while attending predominantly white institutions (Guiffrida & Douthit, 2010), which may potentially contribute to the greater number of problems reported by African American first year student-athletes after accounting for drinking level.

Overall, the models predicting sport-related and other problems were less impressive than the alcohol-related problems model, explaining only about 7% and 4% of the variance, respectively. Therefore, it is likely that other contributing factors not measured in this study are driving the differences in the number of sport-related and other problems and should be examined in future research. The model for alcohol-related problems was the most impactful model, with over 25% of the variance in alcohol-related problems explained by the predictors. Given that the included predictor variables have been consistently found to be related to alcohol consumption, it is logical that these variables also predict alcohol-related problems. Findings from the alcohol-related problems model further underscore the relationship between alcohol consumption and the experience of problem outcomes. Thus, interventions aimed at collegiate first year student-athletes might be most effective when they both intervene to reduce alcohol use and promote harm prevention strategies that reduce the risk of experiencing alcohol-related problems (Marlatt, et al., 1993).

Limitations

A limitation of this study is the self-report nature of the data and whether first year student-athletes accurately report their own alcohol use and problem outcomes. However, self-report has been shown to be a reliable and valid approach to measuring alcohol-related outcomes (Del Boca & Darkes, 2003). Another potential

measurement-related limitation is the categorization of data. For this study it was necessary to create drinking categories based on specific cutoffs (i.e., enable comparisons between alcohol use categories which would have been missed if the drinking variable was continuous). However, an inherent limitation of this strategy could have led to the categorization of first year student-athletes as light drinkers even if they were daily drinkers but consumed alcohol below the risky drinking threshold. This may have failed to distinguish some of the light drinkers who drink more frequently but not in large quantities. Lastly, because this study used cross-sectional data, only concurrent relationships were investigated which does not aid in determining whether these factors predict changes in reported problems over time.

Despite these limitations, this study was strengthened by the inclusion of a large sample with representation from many NCAA institutions across all three divisions, which enhances the generalizability of the findings. Further, we did not rely on first year student-athletes to self-attribute specific problems to their alcohol use, which has been a limitation of previous research. Most importantly, the inclusion of non-drinkers is a key contribution of this study to the literature and aids in the determination of which level of drinking results in a significant increase in various reported problems.

CONCLUSION

Findings presented in this study help to further connect alcohol use and problem outcomes among first year student-athletes within the context of other sport and demographic factors. With the exception of the very small effect of light drinkers experiencing significantly fewer sport-related problems than non-drinkers, all other models indicate that, when compared to non-drinkers, some level of drinking was predictive of experiencing greater problems. The relationship between light drinkers and fewer sport-related problems should be considered with caution as additional research is needed to further explore this unexpected finding given the large sample size and greater likelihood of Type I error. Additionally, attention should be given to the near linear pattern observed across light to extreme drinkers, with higher levels of drinking showing increased alcohol-related problems over non-drinkers. Intervention developers who aim to decrease

alcohol-related and other problem outcomes experienced by student-athletes should pay close attention to first year student-athletes who are engaging in heavy and extreme drinking. Lastly, continued research is warranted to further investigate sociocultural factors that might explain why female first year student-athletes may report more sport-related problems and why African Americans first year student-athletes may be more likely to experience other problems.

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REFERENCES

Barry, A.E., Howell, S.M., Riplinger, A., Piazza-Gardner, A.K. (2015). Alcohol use among college athletes: Do intercollegiate, club or intramural student athletes drink differently? *Substance Use & Misuse*, *50*(3), 302-307.

Bollen, K., & Lennox, R. (1991). Conventional wisdom on measurement: A structural equation perspective. *Psychological Bulletin, 11*(0) , 305-314.

Bouchery, E.E., Harwood, H.J., Sacks, J.J., Simon, C.J., & Brewer, R.D. (2011). Economic costs of excessive alcohol consumption in the U.S., 2006. *American Journal of Prevention Medicine, 41*(5), 516-24. doi:10.1016/j.amepre.2011.06.045.

Del Boca, F.K. & Darkes, J. (2003). The validity of self-reports of alcohol consumption: state of the science and challenges for research. *Addiction, 98*(suppl 2), 1-12.

Doumas, D.M., Midgett, A. (2015). Ethnic Differences in Drinking Motives and Alcohol Use Among College Athletes. *Journal of College Counseling*, *18*(2), 116-129.

Ford, J.A. (2007). Substance use among college athletes: A comparison based on sport/team affiliation. *Journal of American College Health, 55*(6), 367–373.

Fox, J. (2008). Applied Regression Analysis and Generalized Linear Models. Sage Publications, Los Angeles.

Green, K., Nelson, T.F., Hartmann, D. (2014). Binge drinking and sports participation in college: Patterns among athletes and former athletes. *International Review for the Sociology of Sport, 49*(3-4), 417-434.

Green, G.A., Uryasz, F.D., Petr, T.A., & Bray, C.D. (2001). NCAA study of substance use and abuse habits of college student-athletes. *Clinical Journal of Sport Medicine, 11*(1), 51-56.

Grossbard, J.R., Geisner, I.M., Mastroleo, N.R., Kilmer, J.R., Turrisi, R., & Larimer, M.E. (2009). Athletic Identity, descriptive norms,

and drinking among athletes transitioning to college. *Addictive Behaviors, 34*(4), 352-359. doi:10.1016/j.addbeh.2008.11.011

Guiffrida, D. A., & Douthit, K. Z. (2010). The Black student experience at predominantly White colleges: Implications for school and college counselors. *Journal of Counseling & Development, 88*(3), 311-318.

Lawrence, S. A., Hall, T., & Lancey, P. (2012). The relationship among alcohol consumption, tailgating, and negative consequences. *Journal of Child & Adolescent Substance Abuse, 21*(3), 222-237.

Leichliter JS, Meilman PW, Presley CA, et al. (1998). Alcohol use and related consequences among students with varying levels of involvement with college athletics. *Journal of American College Health, 46*, 257-262.

Marlatt, G. A., Larimer, M. E., Baer, J. S., & Quigley, L. A. (1993). Harm reduction for alcohol problems: Moving beyond the controlled drinking controversy. *Behavior Therapy, 24*, 4.

Martens M.P., Dams-O'Connor K and Beck NC (2006). A systematic review of college student-athlete drinking: Prevalence rates, sports-related factors, and interventions. *Journal of Substance Abuse Treatment, 31*, 305-316.

Martens, M.P. & Martin, J.L. (2010). College athletes' drinking motives and competitive seasonal status: Additional examination of the athlete drinking scale. *Addiction Research & Theory, 18*(1), 23-32

Martin, M. (1998). The use of alcohol among NCAA Division I female college basketball, softball, and volleyball athletes. *Journal of Athletic Training, 33*, 163-167.

Miller, K.E. (2008). Wired: Energy drinks, jock identity, masculine norms, and risk taking. *Journal of American College Health, 56*(5), 481-489.

National Collegiate Athletic Association (NCAA) (2012). National study of substance use trends among NCAA College student-athletes. Indianapolis, IN: NCAA. Retrieved from http://www.ncaapublications.com/productdownloads/SAHS09.pdf

National Collegiate Athletic Association (2014). *NCAA national study of substance use habits of college student-athletes*: Retrieved from http://www.ncaa.org/sites/default/files/Substance%20Use%20Final%20Report_FINAL.pdf

National Institute on Alcohol Abuse and Alcoholism (2014). *Drinking levels defined.* Retrieved from http://www.niaaa.nih.gov/alcohol-your-health/overview-alcohol-consumption/moderate-binge-drinking

Nelson, T.F. & Wechsler, H (2001). Alcohol and college athletes. *Medicine and Science in Sports and Exercise 33*(1), 43-47.

Park, C. L. (2004). Positive and negative consequences of alcohol consumption in college students. *Addictive Behaviors, 29*, 311-321.

Partington S, Partington E, Heather N, et al. (2013). The relationship between membership of a university sports group and drinking behaviour among students at English Universities. *Addiction Research & Theory, 21*(4), 339-347. doi:10.3109/16066359.2012.727507.

Perkins, H. (2002). Surveying the damage: A review of research on consequences of alcohol misuse in college populations. *Journal of Studies on Alcohol and Drugs, 14,* 91.

Substance Abuse and Mental Health Services Administration (2013). *Results from the 2012 National Survey on Drug Use and Health: Summary of National Findings*, NSDUH Series H-46, HHS Publication No. (SMA) 13-4795. Rockville, MD: Substance Abuse and Mental Health Services Administration.

Surujlal, J. & Keyser, E. (2014). Exploring Differences in Demographic Variables and Alcohol Consumption amongst University Student-Athletes. *Mediterranean Journal of Social Sciences. 5,* 23.

Turrisi, R., Mallett, K., Mastroleo, N.R., & Larimer, M.E. (2006). Heavy drinking in college students. Who is at risk and what is being done? *The Journal of General Psychology, 133*(4), 401–420. doi:10.3200/GENP.133.4.401-420

Vest, A.E., & Simpkins, S.D. (2013). When is sport participation risky or protective for alcohol use? The role of teammates, friend-

ships and popularity. *New Directions for Child and Adolescent Development, 140*, 37-55. doi:10.1002/cad.20036.

Wahesh, E., Milroy, J.J., Lewis, T.F., Orsini, M.M., & Wyrick, D. (2013). Hazardous drinking by first-(delete "-")year college-athletes: the differential roles of drinking motives, alcohol consequences, and season status. *Journal of Alcohol and Drug Education.*

Wechsler, H., Davenport, A. E., Dowdall, G. W., Grossman, S. J., & Zanakos, S. I. (1997). Binge drinking, tobacco and illicit drug use and involvement in college athletics. *Journal of American College Health, 45*, 195-200.

Wechsler, H., Eun Lee, J., Kuo, M., Seibring, M., Nelson, T. B., & Lee, H. (2002). Trends in college binge drinking during a period of increased prevention efforts: Findings from 4 Harvard school of public health college alcohol surveys: 1993-2001. *Journal of American College Health, 50,* 203-217.

White, A.M., Kraus, C.L., & Swartzwelder, H.S. (2006). Many College Freshmen Drink at Levels Far Beyond the Binge Threshold. *Alcoholism: Clinical & Experimental Research. 30*(6) 1006-1010.

White, H.R. & Labouvie, E.W. (2000). Longitudinal trends in problem drinking as measured by the Rutgers Alcohol Problem Index. *Alcoholism: Clinical and Experimental Research, 24,* 76A.

Yusko, D.A., Buckman, J.F., White, H.R., & Pandina, R.J. (2008). Risk for excessive alcohol use and drinking-related problems in college student athletes. *Addictive Behaviors, 33*(12), 1546-1556. doi:10.1016/j.addbeh.2008.07.010

Zhou, J., O'Brien, K.S., & Heim, D. (2014). Alcohol consumption in sportspeople: The role of social cohesion, identity and happiness. *International Review for the Sociology of Sport, 49*, 278-293. doi:10.1177/1012690213493105

Zhou, J., Heim, D., & Levy, A. (2016). Sports participation and alcohol use: Associations with sports-related identities and well-being. *Journal of Studies on Alcohol and Drugs, 77*(1), 170-179. doi:10.15288/jsad.2016.77.170