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Take One for the Team? Influence of Team and Individual Sport Participation on High School Athlete Substance Use Patterns

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Abstract

The current web-based survey investigated the association between team or individual sport participation (or both) and self-reported alcohol and tobacco use among high school athletes (N=1,275) transitioning to college. Peak Blood Alcohol Concentration, weekly drinking, and alcohol-related problems were significantly lower among athletes in individual sports compared to other groups. Athletes competing in both team and individual sports reported greater lifetime tobacco use and combined alcohol/tobacco use compared to individual or team sports alone. Preventive strategies targeting HS athletes in general and those participating in team sports in particular may be useful in minimizing future alcohol use and related problems.

1. Introduction

Alcohol and tobacco use co-occur among students in college (Bobo & Histen, 2000; Weitzman & Chen, 2005) and high school (HS) (Jackson et al., 2002; Wetzels, Kremers, Vitoria, & de Vries, 2003). Harrison & McKee (2008) found college students consumed more alcohol while smoking tobacco and were more likely to drink on days they smoked cigarettes. There is also evidence that cigarette smoking is an independent predictor of drinking by college (Tewksbury, Higgins, & Mustaine, 2008) and HS students (Callas, Flynn, & Worden, 2004). Johnson et al. (2000) reported HS smokers were 17 times more likely to be binge drinkers than non-smokers. Recently, researchers have investigated whether a similar pattern occurs among HS and college athletes (Wetherill and Fromme, 2007; Wichstrom & Wichstrom, 2009).

Alcohol and tobacco use among High School (HS) athletes

Some research suggests athletic involvement at a younger age serves as a protective mechanism against alcohol use and cigarette smoking (Pate et al., 2000; Savage & Holcomb,

1999) while among older athletes (i.e. college student-athletes), sports involvement is a risk factor (Hildebrand, Johnson, & Bogle, 2001; Nelson & Wechsler, 2001). Specifically, HS athletes are more likely to binge drink and use illegal drugs than non-athletes (see Lisha & Sussman, 2010 for review). Mays et al (2010) reported that among students who participated exclusively in athletic extracurricular activities, greater involvement in such athletic activities predicted greater alcohol use severity one and five years later.

While athletic involvement is associated with riskier drinking patterns among adolescents and young adults, tobacco use among HS athletes is more complicated. Specifically, participation in sports seems to be protective against cigarette smoking (Peretti-Watel, Beck, & Legleye, 2002; Wichstrom & Wichstrom, 2009), but associated with greater smokeless tobacco use (Melnick et al., 2001; Walsh et al., 2000). Given the complex association between athletics and alcohol and tobacco use, a better understanding of sport-specific factors related to alcohol and tobacco use could inform prevention efforts for HS athletes transitioning to college.

Prevalence of smoking and drinking among college athletes participating in different sports

In the most recent report from The National Collegiate Athletic Association (NCAA) Study of Substance Use of College Student Athletes (NCAA, 2006), 76.9% of intercollegiate athletes reported alcohol use in the past year, and rates of use varied across men's and women's teams (with a low of 63.4% for men's basketball to 94.9% for men's lacrosse). Similarly, rates of tobacco use varied across gender and type of sport, with baseball players reporting the highest rates of spit tobacco (42.0%) and softball players reporting the highest rates of cigarette use (22.6%) (NCAA, 2006). In a similar investigation of substance use patterns among college student-athletes, Ford (2007) demonstrated different rates of binge drinking by type of sport, with results suggesting that male hockey and female soccer players were most likely to binge drink while track athletes were the least likely to do so (Ford, 2007). Rockafellow and Saules (2006) also looked at alcohol use patterns and spit tobacco use between college students participating in team (i.e. baseball, basketball, football, hockey, soccer, and volleyball) and non-team sports (i.e. aerobics, golf, dancing, gymnastics, martial arts, etc). Team sport participants had higher rates of alcohol use and chewing tobacco use than those in non-team sports. Both studies lend support for an assertion that team sport athletes may consume more alcohol than individual sport athletes, but more research is needed to make this assertion with confidence.

While identification of sport-specific alcohol use patterns informs prevention strategies, results reported by the NCAA (2006), Ford (2007), and Rockafellow & Saules (2006) pertain to college athletes only. We are aware of no reported data regarding associations between the type of athletic involvement for HS athletes and their substance use. This is regrettable as the NCAA (2006) report suggests 60.7% of college athletes initiated their drinking in HS. In fact, there is some evidence that among college students who were HS athletes, heavy drinking established in HS continued through their undergraduate careers even if they no longer participated in sports while in college (Turrissi et al., 2004; Wetherill & Fromme, 2007). In addition, research indicates problem drinking in HS is a strong

predictor of problem drinking in college (Hildebrand et al., 2001; Wechsler, Lee, Kuo, & Lee, 2000). Interestingly, Wichstrom and Wichstrom (2009) surveyed a sample of HS students in Norway and followed them up in college, finding level of sports participation in HS (number of days in the past week spent on sports training) was positively associated with drinking in college while the opposite was true for cigarette smoking. In addition, team sport participants (i.e. soccer, team handball) were more likely to drink than those in endurance sports (i.e. running, cross country skiing), whereas participants in either team or endurance sports were less likely to smoke in college. Thus, despite research indicating risk for alcohol use in HS and college athletes, results regarding the relationship between athletics and cigarette smoking and tobacco use are mixed.

Rationale and Hypotheses

Although we know from previous work that athletes experience more alcohol-related problems than do non athletes (Leichliter et al., 1998; Nelson & Wechsler, 2001), we are not aware of any existing literature in which the rates of alcohol-related problems among HS athletes participating in different types of sports (team, individual, or both) were investigated. There has been some speculation in the literature about reasons why athletes involved in team sports seem to consume more alcohol than those in individual sports. Specifically, peer pressure (Leichliter et al., 1998; O'Brien et al., 2007), motivation to participate in sports [i.e. extrinsic motivation among team sports athletes associated with higher alcohol consumption (Rockafellow & Saules, 2006)]; and social norms (Ford, 2007; Martha et al., 2009) all have been proposed as possible factors influencing athletes' drinking. In addition, although there is evidence that tobacco use (cigarette smoking specifically) and alcohol use tend to co-occur among both college and HS students (Harrison & McKee, 2008; Tewksbury, Higgins, & Mustaine, 2008), we are not familiar with any work in which rates of this activity were investigated among HS athletes based on their type of sport. It is possible that type of athletic involvement (team, individual, both) is associated with differences in both alcohol and tobacco use. If so, as a complement to any required alcohol and other drug education or prevention programming that student athletes receive (independent of the level at which they compete), this would provide the opportunity for educators and clinicians to tailor content and incorporate relevant information into programming efforts for students at greatest risk for substance use. Given that drinking patterns established in HS persist into college, and given that early intervention during the transition to college has already demonstrated success in impacting substance use (Turrisi et al., 2009), the potential impact of a targeted brief intervention to specific groups of athletes could then be assessed. Further, preliminary support has been generated for the use of personalized drinking feedback interventions specifically tailored to the needs of college athletes, suggesting that such tailored content is both feasible and potentially effective (Martens, Kilmer, Beck, & Zamboanga, 2010). Thus, the present study will provide preliminary information as to which group of athletes (i.e. those participating in team sports, individual or both) are at greater risk for alcohol and tobacco use such that brief intervention programs could be designed (or existing programs supplemented) to best meet the needs of these student athletes.

The primary aim of the current study was to assess differences in HS athletes' alcohol use and alcohol-related consequences as a function of type of athletic involvement (i.e., team, individual, or both). Based on prior work (Ford, 2007; Rockafellow and Saules, 2006), we hypothesized HS athletes in team sports would report greater alcohol use and consequences than those in individual sports. A secondary aim was to investigate the extent to which tobacco use and concurrent alcohol and tobacco use would vary between HS athletes in team or individual sports. These analyses were exploratory, as previous research in these areas are lacking.

2. Method

2.1 Participants and Recruitment

Participants were recruited as part of a longitudinal, multisite study to reduce alcohol use and associated problems in matriculating college students. The study was conducted at a large, public northeastern university and a large, public northwestern university. The original study was a randomized clinical trial, and the present sample comes from the initial screening and baseline surveys. For a more detailed description of the original efficacy study, please refer to Turrisi et al. (2009). Incoming freshman ($N = 4,000$) randomly selected from the registrar's database were mailed an invitation letter containing information about the study, a URL, and a Personal Identification Number (PIN) to access an online screening survey. Of students providing consent and completing the survey ($n = 1,803$, 45% of those invited to participate), 79% ($n = 1,419$) reported participating in high school athletics (study target population), and 1,275 students (89% of study target population) completed the baseline assessment. Participants received \$10 and \$25 for completing screening and baseline assessments, respectively.

Participants were 55.6% female ($n = 709$) with 4.5% identifying as Hispanic or Latino(a); 79.8% were Caucasian, 10.1% Asian, 3.7% Multiracial, 2.0% African American, 0.5% Native Hawaiian or Other Pacific Islander, 0.2% American Indian/Alaskan Native, 3.2% Other and 0.4% did not identify race/ethnicity, comparable to the demographics of participating campuses.

2.2 Measures

Alcohol use—Estimated peak blood alcohol content (peak BAC) was calculated based on participants' reported maximum drinks consumed on an occasion in the past 30 days and the number of hours they spent drinking on that occasion (Dimeff et al., 1999; Marlatt et al., 1998; Matthews and Miller, 1979). Participants indicated how many drinks they consumed on each day of a typical week using the Daily Drinking Questionnaire (DDQ; Collins et al., 1985).

Alcohol-related consequences—The 23-item Rutgers Alcohol Problem Index (RAPI; White and Labouvie, 1989) was used to assess alcohol consequences within the past 3 months. Participants indicated the number of times they experienced each consequence on a scale from *Never* (0) to *More than 10 times* (4). Prevalence was coded as the sum of consequences experienced at least once ranging from 0–23.

Tobacco use—Items from the Core Institute’s Campus Assessment of Alcohol and Other Drug Norms were used to assess lifetime tobacco use, with response options including “zero times”, “1–2 times”, “3–5 times”, “6–9 times”, “10–19 times”, “20–39 times,” and “40 or more times” (Presley et al., 1996). Based on responses, we divided our sample into participants who had used tobacco and those who had never used. We defined tobacco use as use of cigarettes and/or smokeless tobacco. Students who used tobacco were also asked how frequently they consumed alcohol on occasions they used tobacco, to assess *concurrent alcohol/tobacco use*.

Demographics and type of sport—Standard demographics were obtained for participants, including age, gender, ethnicity, and athlete status. Students were presented with a list of 28 sports and asked to indicate in which sport(s) they had participated as part of organized HS and/or elite club athletics during the past year. Based on categorization of *team* and *individual* sports used by Rockafellow and Saules (2006), we created a ‘type of sport’ variable reflecting participants report of playing a *team sport* (e.g., basketball, football, soccer), *individual sport* (e.g., track and field, golf), or *both an individual and team sport* in the past year.

3. Results

3.1 Data Analytic Strategy and Preliminary Analyses

We conducted multivariate analysis of variance (MANOVA) to evaluate mean differences in alcohol use (i.e. peak BAC, weekly quantity of alcohol consumption) and alcohol- related problems as a function of type of sport. In addition, we conducted chi-square analyses to evaluate whether type of sport was associated with different patterns of tobacco use and combined alcohol and tobacco use. Descriptive statistics for all drinking variables are in Table 1 while descriptive statistics for tobacco use and concurrent tobacco and alcohol use are in Table 2 and 3 respectively. As seen in Table 1, of 1,275 high school athletes, 335 indicated participation in an individual sport (e.g., track and field, tennis), 426 were on a team sport (e.g., basketball, football), and 503 were on both an individual and team sport.

3.2 MANOVA Results

We conducted one-way MANOVAs to assess whether drinking outcomes differed significantly by type of athletic involvement (i.e. individual, team, or both). The following dependent variables (DVs) were included to assess drinking and related consequences in the past year: peak BAC, weekly quantity of alcohol consumption, and alcohol-related problems. The combined DVs differed significantly by the type of sport, Wilk’s $\lambda = .97$, $F(9, 3018) = 3.34$, $p = .001$; $\eta^2 = .01$.

3.2a Follow-Up Univariate Analyses

To examine the individual DVs, we performed ANOVAs and utilized a Bonferroni correction to control for Type I error, resulting in an adjusted alpha of .016. Follow up ANOVAs, with type of sport as the independent variable (IV), were significant for all of the alcohol DVs tested, including peak BAC ($F(3, 1271) = 7.41$, $p = .000$, $\eta^2 = .01$); weekly

drinking quantity ($F(3, 1271) = 8.69, p = .000, \eta^2 = .02$); and alcohol-related problems $F(3, 1271) = 4.03, p = .007, \eta^2 = .01$).

3.2b Post hoc Analyses

We subsequently conducted pairwise comparisons to more closely evaluate the significant association found between type of athletic involvement (i.e. individual, team, or both) and drinking outcomes. Results indicated that for peak BAC, weekly alcohol consumption, and alcohol-related problems, those in individual sports reported significantly lower alcohol consumption and related problems compared to athletes in either team sports or combined team and individual sports.

3.3 Chi-square Results

Descriptive statistics for tobacco use variables are presented in Tables 2 and 3. We conducted a chi-square to assess whether type of sport participation was related to tobacco use and concurrent tobacco and alcohol use. We evaluated lifetime tobacco use (yes/no) and lifetime concurrent tobacco/alcohol use (yes/no) as DVs. For lifetime tobacco use, we found significant results, $\chi^2 = 8.98, df = 3, p = .03$, such that participants competing in both team and individual sports were more likely to have used tobacco than athletes involved exclusively on a team or individual sport (see Table 2). Among athletes who endorsed lifetime concurrent tobacco/alcohol use, we found a trend, $\chi^2 = 6.84, df = 3, p = .07$, indicating that participants competing in both team and individual sports were more likely to have used tobacco and alcohol concurrently than athletes involved exclusively in team or individual sport (see Table 3).

4. Discussion

In the present study, we aimed to extend previous findings that drinking patterns among HS athletes in Norway (Wichstrom and Wichstrom, 2009) and college athletes in the U.S. (Ford, 2007) vary by the type of athletic involvement. Specifically, we were interested in assessing whether type of sport (team, individual, or both) would be associated with differences in alcohol use, alcohol consequences, tobacco use, and concurrent alcohol and tobacco use among HS athletes transitioning to college.

As predicted, different drinking patterns emerged based on the type of sport (individual, team, or both) in which HS athletes participated. Specifically, peak BAC, weekly alcohol consumption, and alcohol-related problems were significantly lower among HS athletes participating in individual sports than among those in either team sports or a combination of team and individual sports. Since we did not find any significant differences between team sports and combined team and individual sports in their alcohol consumption and alcohol-related problems, alcohol use might be influenced by team membership. Perhaps team athletes are more influenced by factors such as access, norms, and social facilitation of use (O'Brien et al., 2007; Martha et al., 2009). Given research suggesting greater isolation on college campuses among athletes compared to non-athletes (Damm & Murray, 1996; Harvey, 1999), the social drinking milieu of athletes may include their team members, providing a context for enhancing team cohesiveness. Still, we need to be careful when

speculating about possible explanations to differences in either alcohol or tobacco consumption among athletes, and future studies can continue to examine factors contributing to health and risk behaviors as a function of type of sport (including identification with the team, perceived demand to the student-athlete, perceived responsibility to the team by the student-athlete, etc.).

Regarding tobacco use, our results suggest that among HS athletes, those who participate in both types of sports are more likely to have used tobacco in their lifetimes than those in either individual or team sport. Moreover, our results suggest that there is a trend towards differences in the lifetime concurrent tobacco and alcohol use among this population. Specifically, those students who participate in both types of sports may be more likely to have used tobacco and alcohol concurrently than those in either individual or team sports alone. Therefore, our results indicate athletes participating in both team and individual sports may be at higher risk for tobacco use and concurrent tobacco/alcohol use than those engaged in either sport alone. These findings highlight the importance of providing efficacious prevention and/or intervention efforts to those involved in sports, with a specific emphasis on alcohol for those in team sports, and the potential to provide targeted interventions addressing concurrent alcohol and tobacco use for those involved in team and individual sports across multiple seasons.

Limitations and Future Directions

Several limitations should be considered. As with any data based on self-report, biases are a concern. Specifically, variance in times and locations of assessments and concerns about confidentiality and security of data provided over the web are some potential drawbacks. However, assurances of confidentiality were stated throughout the survey and consent form. A measure of social desirability was also included, and consistent with previous research (Laforge et al., 2005), we found no evidence of self-report bias. Our measure of tobacco use was limited in that it did not differentiate between chewing tobacco and cigarette use. This limited the ability to make direct comparisons to other studies, yet this general variable still resulted in the opportunity to document differences across type of sport. Future studies should consider a more sophisticated measure that takes cigarettes and spit tobacco into account.

As our data were cross-sectional, we cannot make causal statements about relationships between athletic participation, alcohol use, alcohol use-related consequences, and tobacco use. Further research should longitudinally assess athlete alcohol and tobacco use in order to compare these behaviors before and after students' transition to college and examine predictive variables related to outcomes. Studies should also explore individual sport-to-sport differences and consider using non-athlete HS and college students as comparison groups. Finally, research should examine associations between sport and academic-related factors in relation to drinking and tobacco use during the academic year to evaluate potential differences among athletes' in-season and off-season substance use patterns.

Conclusions

In the present study, we extended existing literature on substance use patterns among athletes by showing that alcohol use patterns and alcohol-related problems vary among HS athletes depending on the type of sport in which they participate. This is particularly salient, as HS drinking habits are a strong predictor of college drinking habits (O'Malley and Johnston, 2002). Moreover, we added to the limited research regarding tobacco use among HS athletes by showing that lifetime tobacco use patterns and concurrent use of alcohol and tobacco differ based on the type of sport.

Our results suggest implications for researchers, clinicians, parents, and sports mentors, as preventive strategies can be implemented targeting HS athletes, in particular those participating in team sports. Given that our team sport athletes were more likely to report problematic alcohol use than those in individual sports, sport mentors and parents could help those at-risk athletes by monitoring them more closely and facilitating the implementation of early intervention and prevention programs at their respective educational facilities. Because our findings suggesting that team sports athletes are more likely to consume alcohol and are more likely to use tobacco and alcohol products concurrently than those HS athletes who participate in individual sports, prospective intervention strategies may benefit from focusing specifically on team sports athletes, targeting specifically alcohol and concurrent alcohol/tobacco use among those athletes, and aiming at presenting factual norms and discussing how group involvement may play a role in alcohol/tobacco consumption among athletes. Additionally, both clinicians and researchers would benefit from more research in this area in order to develop more efficacious prevention and early intervention and programs for this specific population.

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Table 1

Descriptive statistics for alcohol-related variables

	Overall (n=1275)	Individual (n=335)	Group (n=426)	Both (n=503)	P-value
Peak BAC	.07 (.09)	.05 (.08)	.08 (.09)	.08 (.09)	.000
DDQ	3.9 (6.2)	2.5 (5.1)	4.5 (6.5)	4.4 (6.5)	.000
RAP1	2.3 (3.1)	1.8 (2.9)	2.5 (3.1)	2.5 (3.2)	.013

Note: DDQ =Daily Drinking Questionnaire; RAP1 = Rutgers Alcohol Problem Inventory

Table 2

Percentages of participants in various sports reporting tobacco use in their lifetime (yes/no).

	Individual	Team	Both
Yes	40%	22%	48%
No	60%	78%	52%
Total	100%	100%	100%

Table 3

Percentages of participants in various sports reporting to have engaged in concurrent tobacco and alcohol use in their lifetime (yes/no).

	Individual	Team	Both
Yes	15%	18%	22%
No	85%	82%	78%
Total	100%	100%	100%