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Examination of the Meditational Influences of Peer Norms, Environmental Influences, and Parent Communications on Heavy Drinking in Athletes and Nonathletes

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Abstract

The present study used perspectives from the general literature on college alcohol consumption to examine mediational influences of peer, environmental, and parental variables on heavy drinking for student athlete and nonathlete samples. Eight hundred thirty-five freshmen who differed in organized sports involvement were compared on heavy drinking outcomes, peer norms, environmental influences, and parental communication. College athletes reported significantly more heavy drinking experiences than nonathletes. Peer norms, environmental influences, and parental communication were all significant mediators of the athlete–heavy drinking relationship. Athletes reported a higher perception of peer drinking, peer approval of drinking, higher alcohol availability, and direct drink offers, which, in turn, were related to higher rates of heavy drinking. Parental communication mediated the athlete–heavy drinking relationship differently, depending on the specific topic of conversation. Discussion surrounding the importance of incorporating a variety of interventions aimed at reducing collegiate athlete drinking on the basis of the peer, environmental, and parental influences observed in the present analyses are presented. Limitations and directions for future research are also noted.

Keywords

college students; athlete; alcohol

Alcohol is consistently cited by researchers, college administrators, and students as the most pervasively misused substance on college campuses (Dimeff, Baer, Kivlahan, & Marlatt, 1999; Perkins, 2002). Studies have shown approximately 18% of college students (ages 18–24) met *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition (*DSM-IV*; American Psychiatric Association, 1994) criteria for alcohol abuse or dependence in the past

year (Dawson, Grant, Stinson, & Chou, 2004). Furthermore, reports continue to document the negative consequences associated with college student drinking such as academic problems, injuries, alcohol poisonings, unintended and unprotected sexual activity, and impaired driving (Wechsler, Molnar, Davenport, & Baer, 1999).

Baer (2002) has noted that there is significant variability within the college population, with the heaviest drinkers consuming almost 70% of the alcohol (see also Wechsler et al., 1999). Meilman, Leichliter, and Presley (1999) observed the highest consumption tends to occur in individuals who combine Greek membership and athletics, followed by Greek nonathletes, and non-Greek athletes. Although many studies have examined the psychological constructs related to Greek students' alcohol consumption (Bartholow, Sher, & Krull, 2003; Caron, Moskey, & Hovey, 2004; Larimer, Anderson, Baer, & Marlatt, 2000; Presley, Meilman, & Leichliter, 2002; McCabe et al., 2005; Weschler, Kuh, & Davenport, 1996), researchers have noted far fewer studies examining such variables in athletes (Damm & Murray, 1996; Evans, Weinberg, & Jackson, 1992; Martens, Cox, Beck, & Heppner, 2003; Martens, Dams-O'Connor, Duffy-Paiement, & Gibson, 2005; Nattiv, Puffer, & Green, 1997; Thombs, 2000; Wilson, Pritchard, & Schaffer, 2004). Theory-driven interventions for alcohol misuse by athletes are scarcer (Larimer & Cronce, 2002; Thombs & Hamilton, 2002).

One explanation for the paucity of studies is the misperception that sport participation reduces the risk of youth substance abuse by providing fewer opportunities to have unsupervised free time and greater time spent with responsible adult role models (Strauss & Bacon, 1953). Another unsupported explanation has been that student athletes are less likely to drink because of the detrimental nature of alcohol on performance (Eitle, Turner, & McNulty Eitle, 2003; Leonard, 1995). Finally, researchers have suggested that alcohol advertising revenue is a major influence on college campuses, and this may have an impact on administrative decision making regarding limits addressing alcohol- and sport-related problems (Marin Institute, 2006). Fortunately, the few studies that have examined the prevalence of student athlete alcohol consumption are quite informative because they examined large samples (Leichliter, Meilman, Presley, & Cashin, 1998) and numerous and diverse campuses (Nelson & Wechsler, 2001; Wechsler, Davenport, Dowdall, Grossman, & Zanakos, 1997). Research has shown that athletes engage in significantly more binge drinking episodes, report drinking to levels of intoxication, and drinking with the intention to become intoxicated significantly more than nonathletes. For example, Nelson and Wechsler (2001) found that athletes reported more extreme forms of alcohol consumption (e.g., engaged in heavy episodic binge drinking), reported more occasions of drunkenness, and getting drunk was an important reason for drinking. Furthermore, athletes relative to nonathletes experienced significantly more consequences such as missed classes, falling behind in school, interpersonal problems, unprotected sex, required medical treatment, being a crime victim, vandalism, and trouble with the law, to name a few (Hildebrand, Johnson, & Bogle, 2001; Leichliter et al., 1998; Nelson & Wechsler, 2001).

When notable group differences are observed, it is often presumed that they are a result of mediating variables. These mediational variables help explain the processes underlying the group's influences on the outcomes. Mediation analyses can then be used to assess the processes and subsequently identify potentially important variables to target in future intervention efforts. This was the focus of the present study in examining heavy drinking (e.g., drunkenness frequency, heavy episodic drinking frequency, and peak consumption). The mediating variables we chose to examine were based on the general college literature, which suggests student consumption is impacted by peer influences (Baer, 1994; Borsari & Carey, 2000), elevated availability of alcohol in the college environment (Bergen-Cico, 2000), and reduced social controls (Hawkins, Catalano, & Miller, 1992; Turrisi, Wiersma, & Hughes,

2000). The theoretical relationships of these variables in the general and athlete-specific college alcohol literature are discussed in turn.

Peer Influences

Peer influence on college student drinking has been described as permissive and perhaps supportive of heavy consumption practices (Baer, 2002). Studies have found that students' drinking patterns tend to be similar to their peers and may be elevated due to overestimating peer behavior (Baer, Stacy, & Larimer, 1991; Fromme & Ruella, 1994; Hartzler & Fromme, 2003; Larimer, Turner, Mallett, & Geisner, 2004). Studies conducted with athletes in which the effects of perceptions of peer norms have been examined have shown mixed results. Thombs (2000) found that college student norms were better predictors of athlete drinking than athlete-specific norms, whereas Martens et al. (2005) found that to be the case for female athletes but not for male athletes. Male athletes' drinking was predicted better by their athlete peers. In both studies, the focus was on descriptive norms (what student athletes think their friends are doing with regard to alcohol consumption), despite studies that have suggested the importance of both descriptive and injunctive norms (what their friends consider is acceptable drinking behavior in terms of how often and how much) in predicting drinking (Carey, 1993, 1995; Graham, Marks, & Hansen, 1991; Larimer, Irvine, Kilmer, & Marlatt, 1997; Larimer et al., 2004; Wood, Read, Palfai, & Stevenson, 2001). The present study therefore included both types of normative peer influences in the analysis of mediators.

Environmental Influences

Environmental constructs such as availability and access to alcohol, messages in the media, public and institutional policies and practices have all been implicated as predictors of heavy drinking with general college samples (Clapp et al., 2003; Toomey & Wagenaar, 2002). Although there has been speculation that athletes have greater access to parties and social gatherings where alcohol may be available due to their high-profile status (Harvey, 1999), no studies have specifically examined environmental pressures to drink on student athletes. Our research focused on assessing the perceived availability of alcohol where the students reside, how much drinking goes on where the students reside, and direct offers of drinks. The present research should offer perspectives on perceived environmental pressures to consume alcohol between athletes and nonathletes.

Parental Social Controls

Finally, a growing body of literature on adolescents and college students support the premise that parental communication and general parenting behaviors tend to be predictors of reduced drinking and alcohol-related consequences even after students have left home and are away at college (Brennan, Walfish, & AuBuchon, 1986; Ennett, Bauman, Foshee, Pemberton, & Hicks, 2001; Kafka & London, 1991; Turrisi, Jaccard, Taki, Dunnam, & Grimes, 2001; Turrisi et al., 2000). In contrast, no studies have examined these influences on student athlete drinking. The present research contrasts the groups in terms of the frequency of communication about alcohol as well as the nature of these communications (e.g., whether they discuss physical risks, legal risks, social risks, and academic risks). The research should then offer perspectives on what is said versus how it is said in these diverse groups, which could inform prevention efforts.

In summary, the present study used perspectives from the general literature on college alcohol consumption to examine mediational influences of peer, environmental, and parental variables on heavy drinking for student athlete and nonathlete samples. The hypothesis of the study is threefold. First, we hypothesize athletes will engage in heavier drinking than nonathletes, presumably mediated by peer, environmental, and parental influences. Second, we hypothesize athletes will experience greater peer influences, greater environmental influences, and weaker

parental influences regarding drinking. Finally, as peer influences that encourage heavy drinking increase, as drinking in one's environment increases, and as parental influences decrease, heavy drinking will increase.

Method

Sample

Respondents consisted of 835 freshmen (63.47% female, $n = 530$) from a moderately sized northwestern university participating as part of general psychology course sections. The university where the research took place participated at the National Collegiate Athletic Association (NCAA) Division I level. Students were given partial course credit for participating in this study. Student athlete classification was determined through the response to question about whether they were either a *collegiate athlete* (defined as presently involved in varsity or club sports at the collegiate level) or a nonathlete. Within the sample, 75.6% were classified as nonathletes (68% female), and 24.4% stated they were currently participating in college athletics (48% female). Although ours is a convenience sample drawn from human subject pools, sample is consistent with proportions of athletes and nonathletes the University and similar to other schools within the conference affiliation. Participants were primarily Caucasian (86.4%), with 6.6% Hispanic, 2.5% Asian, 0.6% African American, and 3. "other." The mean age of the sample was 18.8 ($SD = 1.24$) years. Each participant read and completed an informed consent form before participating in the study. Prior to initiation, this study was approved by the university Institutional Review Board, and treatment of participants was in compliance with American Psychological Association ethical guidelines.

Measures

All measures were drawn from the previous literature on college alcohol consumption (Baer, 1994; Baer et al., 1991; Collins, Parks, & Marlatt, 1985; Larimer et al., 2001; Turrisi et al., 2001, 2000; Wechsler, Dowdall, Maenner, Glenhill-Hoyt, & Lee, 1998). previous studies with adolescents, college students, and adults (Turrisi, 1999; Turrisi & Jaccard, 1991; Turrisi et al., 2001), have observed high test-retest reliability estimates (coefficients from $r = .72$ to $r = .91$), good convergence between items within a domain (e.g., drinking, peer norms), and nonsignificant correlations between the measures and indices of social desirability.

Drinking Tendencies

Heavy drinking was assessed with three items. First, students were asked "During the past 30 days (about 1 month), how many times have you gotten drunk, or very high from alcohol?" (Turrisi, 1999). Response options ranged from 1 (*never*) to 5 (*more than times*) on a 5-point scale. Second, students were asked "In the two weeks, how many times did you have 5 or more drinks in row on a single occasion (e.g., in the same evening)?" Finally, students were asked "What is the most number of drinks that you have consumed on any given night in the past three months?" The latter two questions were open-ended, and students responded writing in a number that reflected their answers. All questions were operationalized using the definition of a standard drink (i.e., 12-oz beer, 4-oz. wine, 1-oz. distilled liquor). Items were standardized and combined to create one index of heavy drinking ($\alpha = .708$).

Peer Drinking Norms

Descriptive norms—Items from the Drinking Norms Rating Form (Baer et al., 1991) were used to assess peer descriptive norms related to alcohol use. Questions aimed at understanding role of descriptive norms variables included (a) "How many your close friends drink alcohol?" (b) "How many of your friends get drunk on a regular basis (at least once a month)?" and (c) "How many of your close friends drink primarily to get drunk?" Items were scored on

a 5-point scale ranging from 0 (*none*) to 4 (*nearly all*). Wood and colleagues (2001) used this scale in a recent study and reported coefficient alpha scores of .79. In the present study, items were combined to create a single item index of descriptive norms ($\alpha = .91$).

Injunctive norms—The item examining injunctive norms was drawn from previous research (Wood et al., 2001). The wording was as follows: “How would your close friend feel if you had 5 or more drinks once or twice each weekend?” The item was scored ranging from 1 (*strong approval*) to 7 (*strong disapproval*).

Environmental Influence

The three items used to assess environmental influence were adapted from the work of Wood et al. (2001) and examined the influence of the environment on alcohol use.

Perceptions of drinking in the environment where students reside—The item asked students “When people where you live drink, how much does each person drink?” Students were asked to write in the number of drinks for the typical individual.

Availability of alcohol where the students reside—Students were asked “How often is beer available where you are currently living?” A Likert-type scale was used, with responses ranging from 1 (*not at all*) to 4 (*frequently*). One additional item was asked, substituting beer with liquor. These items were combined to create a single item index of alcohol availability ($\alpha = .866$).

Direct offer of drinks—Students were asked the following three items: “In the past 30 days, (a) how many times have you been offered a drink? (b) how many times have you been given a drink without asking for it? and (c) how many times has someone bought you a drink without you asking for it?” For each item, responses options were 0 = *never*; 1 = *–2 times*; 2 = *3–5 times*; 3 = *6–9 times*; 4 = *10 or more times*. Items were summed to create a single item index of direct offers of drinks ($\alpha = .864$).

Parental Communication

Parental communication was examined using measures from past research on various aspects of parent–teen communication about alcohol (Turrisi et al., 2001). The overall frequency of communication about alcohol was assessed by asking students “Overall, how would you rate the extent to which your parent/s talked to you about drinking?” Students responded to the item on an 11-point scale ranging from 0 to 10. Corresponding with the numbers were the phrases 0 = *not at all*, 3 = *somewhat*, 6 = *a moderate amount*, and 9 = *a great deal*.

Wording of the specific parent drinking communication stem was, “At some point during the summer prior to starting college, my parents and I talked about,” followed by items assessing *physical risks*: (a) the importance of being committed to a healthy lifestyle; *legal risks*: (a) how drinking could get me in trouble with the police, (b) the negative things that would happen if I were caught drinking by the police, and (c) drunk driving and its consequences ($\alpha = .906$); *social risks*: (a) how embarrassing it would be for the family if I were caught drinking, (b) how being caught drinking might result in publication of my arrest in the newspaper ($\alpha = .723$); and *academic risk*: (a) how being caught drinking might lead to suspension from school. Responses were made on Likert-type scales, with responses ranging from 1 (*not all*) to 4 (*a great deal*). Higher scores reflected more communication.

The joint significance test of α and β was used to assess mediation. In a Monte Carlo study, MacKinnon, Lockwood, Hoff man, West, and Sheets (2002) examination of mediational techniques revealed that the joint significance test had the most power and the most

conservative Type I error rates compared with other methods (such as the more common Baron & Kenny, 1986, approach). Regression analyses were used to test the α and β paths found in the model, shown in Figure 1, using AMOS 5.0 in SPSS. The α path (the effect of the group on the hypothesized mediator) is assessed for statistical significance at the same time as the β path (the effect of the mediator on the outcome) using Amos 5.0 SPSS. If both the α and β paths jointly show significance at the level, then there is evidence for a significant mediating relationship (e.g., being in the athlete/nonathlete group effects the outcome variable through changes in the mediating variables; MacKinnon, 1994). The mediated effect is the product of the α and β values ($\alpha\beta$) and provides an estimate of the relative strength between mediated effects.

When there is evidence for significant mediation (the $\alpha\beta$ paths jointly show significance), confidence intervals (95%) can be calculated to provide a more precise range of estimates for actual mediated effect value (Shrout & Bolger, 2002). Given that the regression coefficient provides an estimate for the actual mediated effect ($\alpha\beta$), the confidence intervals around the coefficient provide an estimate of the range of the effect. To the extent these confidence intervals do not contain the value of zero, this is further evidence that the mediated effect is significantly different than zero. We derived confidence intervals using a bootstrapping procedure in AMOS 5.0 in SPSS because of nonnormal distributions on our mediational and outcome measures. For the analyses, athletes were coded as 1 and nonathletes as 0.

Results

The focus of the analyses examined whether the theoretical constructs (peer, environmental, and parental influences) significantly mediated the relationship between athlete status and heavy drinking. The results are presented in sections. The first section and Table 1 provide descriptive information on group differences between athletes and nonathletes on heavy drinking. The following sections describe results from the mediational analyses. First, effect of group on the predicted mediators (peer, environmental, and parental influences) is presented. Second, the relationships between the mediational variables within a domain are described. Third, the impact the mediators have on heavy drinking is identified. Finally, the results of the full mediation model presented in Figure 1 are reported for all mediators. Correlations between items are noted in Table 2. Results of the mediation analyses are reported in Table 3.

Athlete Status Effects on Heavy Drinking

A 2×2 (Group $\times$ Gender) analysis of variance (ANOVA) was conducted to examine differences between athletes and nonathletes on heavy drinking. Results indicated athletes reported getting drunk significantly more often than nonathletes, $F(1, 833) = 12.463$, $p < .001$, $\eta^2 = .036$; engaged in more episodes of heavy drinking, $F(1, 833) = 20.839$, $p < .001$, $\eta^2 = .028$; and consumed significantly more drinks on their most recent peak drinking occasion, $F(1, 833) = 15.041$, $p < .001$, $\eta^2 = .024$, compared with nonathletes. No significant interaction between athletic status and gender was observed. Means and standard deviations for athletes and nonathletes on drinking outcomes are located in Table 1.

Relationships Between the Mediator Variables Within a Domain

The correlations in Table 2 reveal low-to-moderate relationships between different variables within a domain (e.g., .3–.5). In the instances of higher correlations between the variables within a domain, such as injunctive and descriptive norms (e.g., .593), these could have probably been combined into one general peer influence variable. However, in subsequent analyses, these variables are treated as separate constructs because we thought it extended the work from what had been done in earlier studies, which only examined general norms and environmental influences.

Athlete Status Effects on Mediators

Peer influences—Athlete status effects ($p < .001$) were significant for both peer injunctive and descriptive norms (Table 3, Group effect on mediator [α] column). For example, athletes reported having more peers who got drunk and more peers who would not disapprove of them having 5 or more drinks one or two times each weekend compared with nonathletes.

Environmental influences—Athlete status effects ($p < .001$) were also significant for all three environmental items. Athletes reported having more drinking going on, more alcohol available where they lived, and having more drinks given to them without asking than nonathletes.

Parental influences—Finally, the results showed significant athlete status effects (p values ranged from $< .05$ to $< .001$) on parental communication mediators, with the exception of parental communication about academic consequences of alcohol use. Athletes reported having more conversations about the physical, legal, and social consequences of drinking with their parents than non-athletes.

Mediator Effects on Heavy Drinking

Peer influences—Examination of the β paths in Table 3 revealed significant relationships with both peer descriptive and injunctive norms when controlling for athlete status effects. For example, as peer influences, such as perceived peer approval of drinking and perception of peers' alcohol consumption, increased, so did heavy drinking.

Environmental influences—Similarly, significant relationships emerged between environmental influences and heavy drinking. As availability of alcohol, direct offers of alcohol, and increased drinking in one's environment increased, so did heavy drinking.

Parental influences—Finally, significant relationships were observed between parental influences and heavy drinking, with the exception of parental communication about academic consequences of alcohol use. Positive relationships emerged among overall parent communications as well as communications about legal and social consequences associated with alcohol use and heavy drinking. In contrast, the relationship between communication of physical consequences of alcohol use and heavy drinking was negative. This suggests that as parental communication increased, so did heavy drinking, with the exception of communication about the physical consequences of alcohol use. As parental communication about the physical consequences associated with alcohol use increased, heavy drinking decreased.

Mediated Effects

Mediated effects were considered significant to the extent that the α and β paths were both significant on the basis of the Monte Carlo study conducted by MacKinnon et al. (2002). Further evidence of their significance can be assessed by examining the 95% lower and upper confidence intervals. When these intervals do not contain the value of zero, the mediated effect is considered to be significantly different than zero. The last column in Table 3 contains p values for the mediated effects.

Peer influences—As hypothesized, significant mediated effects ($\alpha\beta$) were observed for both peer descriptive and injunctive norms. The results demonstrate athletic participation was positively related to peer norms, which, in turn, were related to heavy drinking.

Environmental influences—Similarly, significant mediated effects were observed for availability of alcohol, direct offers of alcohol, and amount of drinking in one's living environment. Consistent with the research hypotheses, athletes were more likely to endorse increased environmental influences related to alcohol use, which were positively related to heavy drinking.

Parental influences—Finally, our hypotheses were not fully supported in relation to parental influences. Significant mediated effects were observed for overall frequency of communication and parental communication about legal, social, and physical consequences associated with alcohol use. All significant relationships were positive, with the exception of communication about physical consequences. Athletes were more likely to report communicating with their parents about physical consequences associated with alcohol use, and, in turn, reported decreased heavy drinking. The mediated effects that were positive in nature suggested athletes reported increased communication with parents about social and legal consequences of alcohol use but, in contrast, reported higher rates of heavy drinking. The construct parental communication about academic consequences of alcohol use was not a significant mediator of athletic status and heavy drinking.

Discussion

College student alcohol misuse represents a major social problem (Perkins, 2002). For some students, alcohol consumption and negative consequences emerge after college matriculation; however, studies have indicated many students continue or escalate drinking that was initiated in high school (O'Malley & Johnston, 2002). Student athletes represent a group who has shown heavy patterns of alcohol use in high school and college (Green, Burke, Nix, Lambrecht, & Mason, 1995; Wechsler et al., 1999), yet few studies have sought to examine the mediational variables that may influence these drinking patterns. The present study sought to elucidate such mediational variables. Specifically, peer influences, environmental influences, and parental influences were examined as mediators of the athlete-heavy drinking relationship.

To begin, we hypothesized athletes would endorse heavier drinking than nonathletes. Our analyses describing heavy drinking between collegiate athletes and nonathletes were consistent with epidemiological studies examining large samples (Leichliter et al., 1998) and diverse campuses (Nelson & Wechsler, 2001; Wechsler et al., 1997). We found athletes engaged in more heavy episodic drinking occasions, endorsed drinking more on peak drinking occasions, and reported getting drunk more frequently than non-athletes. Our findings were consistent with other studies stating that athletes are a high-risk group within the college student population and engage in risky drinking at higher levels than the general student population (e.g., Nelson & Wechsler, 2001; Wechsler et al., 1997).

Peer norms (both descriptive and injunctive) were the first mediators examined in relation to athletic status and heavy drinking. The mediational analyses revealed support for our hypothesis in that the source of drinking differences between athletes and nonathletes could be attributed to athletes' perceptions that their peers tended to drink often and heavily and also to perceptions that their peers would approve of them drinking in a similar manner. The former is also consistent with recent studies examining descriptive norms of student athletes (Martens et al., 2005; Thombs, 2000). Our observation of significant effects for both descriptive and injunctive norms may offer a plausible explanation for the lack of efficacy of Thombs and Hamilton's (2002) social norms intervention in changing athletes' drinking even though they did observe a change in social (descriptive) norms. The Thombs and Hamilton study did not attempt to influence perceptions of what would be considered acceptable drinking behavior (injunctive norms) but rather focused exclusively on descriptive norms of different groups (team, closest friend, students in general). Even though their efforts resulted in more accurate

drinking perceptions, student athletes may have continued to believe it was okay for them to drink heavily without social repercussions. Athletes tend to spend a significant amount of time socializing with other athletes on and off the field (Harvey, 1999), thus acceptance within their specific social group might be more important to them relative to nonathletes. Interventions targeted to athletes might benefit from focusing on peer acceptability of drinking in addition to correcting misperceptions about the amount of heavy drinking.

Second, our mediational analyses showed support for our hypothesis in that individuals who reside in environments that support and encourage heavy consumption tended to drink more. Athletes reported greater exposure to such environments than the nonathletes and subsequently also reported heavier drinking. Recent studies have shown that 72% of National Collegiate Athletics Association (NCAA) athletes reported that more than half of their team consumed alcohol within the last year primarily for recreation or social purposes (NCAA, 2001). Although this figure is likely to be inflated because of the tendency to overestimate drinking of one's peers (Baer et al., 1991), it does reflect the perception that athletes believe there is a significant amount of alcohol consumption in their environments and that they live in a culture that supports drinking heavily (Perkins, 2002). Thus, it is plausible to assume that they will behave in a manner consistent with accepted drinking patterns of the peers in their immediate environment (Prentice & Miller, 1993).

Lastly, our mediational analyses demonstrated the influence of perceptions of parent-teen communication on college student drinking behavior. Our hypothesis regarding the role of parental communication in the athlete-heavy drinking relationship was partially supported because findings were not consistent across the different forms of parental communication. First, a negative mediated effect was observed for communication associated with physical consequences associated with alcohol use. This finding suggests athletes were more likely to have conversations of this nature with parents and, in turn, reported lower rates of heavy drinking. This finding is consistent with literature suggesting parent communications are significantly related to a decrease in alcohol consumption among the general college student population (e.g., Turrisi et al., 2001). Another possibility is that research has indicated that among college athletes, one of the most frequently endorsed reasons for not using alcohol is athletic performance or health-related concerns (e.g., NCCA, 2001), so perhaps this potential consequence was particularly salient for the athletes in the sample.

In contrast, some of the findings showed athletes reported more parental communication related to legal and social consequences than nonathletes, and, in turn, they reported higher heavy drinking. This suggests that certain types of parental communication about drinking are associated with more drinking for student athletes. These positive relationships regarding parental communication were not in the hypothesized direction and could be a result of reactance effects, such that parents may have communicated with their daughter or son about these consequences after discovering she or he used alcohol. Studies in which a decrease in alcohol consumption as a result of parental communication has been shown (e.g., Turrisi et al., 2001, 2000) may have had different outcomes because of the use of different measures of parental communication. Another possibility is that parents might be spending more time talking to freshman college athletes about alcohol use because of a positive association between alcohol use and athletic status at lower competitive levels (i.e., high school). It may be that the college athletes in the sample were drinking more in high school than the nonathletes, so parents were spending more time talking to them in an effort to curb the behavior. Future studies aimed at identifying varying types and timing of communication are needed to more clearly understand the effects of parental communication on high-risk drinking in college student athletes and nonathletes.

This study supports several clinical implications with regard to college students involved in athletics. First, athletes (both varsity and club) are a subpopulation among college students more likely to engage in high-risk drinking. Little research has been conducted on the drinking patterns within this group, and even less has examined intervention strategies that may reduce alcohol consumption. The present study demonstrates differences between athletes and nonathletes with regard to peer norms, environmental influences, parental communication, and heavy drinking. When targeting athletes, findings suggest taking into account interventions that isolate one type of influence, such as social norm interventions that attempt to correct misperceptions of descriptive norms, may be of limited utility. Therefore, interventions targeting high-risk drinking in this population might benefit from comprehensive approaches that address multivariate influences such as those examined in the present study. In addition, future parent interventions may benefit from further focus on the type of parental communication used. The findings suggest parental communication about physical consequences related to alcohol use was related to less heavy consumption in athletes. This suggests athletes may put a different value on physical performance than nonathletes (e.g., scholarship opportunities, inability to participate in one's sport due to injury), and discussion of this specific type of consequence between parents and their college student athlete may make more of an impact on alcohol use in this population.

Although this study has illuminated mediational variables related to athlete alcohol consumption, it is important to identify some of the limitations of the present study. First, we relied on a convenience sample. Our participants were primarily Caucasian, with slightly more female than male participants. A recent NCAA (2001) study of substance use showed limited gender differences, or sport differences, in relation to amounts of alcohol consumed. However, future research needs to be conducted on diverse samples. Second, although our measures were drawn from the college student drinking literature, it should be noted that the complexity of the constructs examined in the present study (i.e., environmental influences) are difficult to capture with published measures. The present study focused on one aspect of environmental influences, specifically access to alcohol, but future studies may benefit from using a wider scope in examining other environmental influences on drinking (i.e., drinking policy enforcement, alternate activities). In addition, these items asked for "current" information pertaining to participants' living arrangements and did not take into account variations in drinking due to the academic term (e.g., less alcohol consumption during exams, more during spring break). Third, our study relied on cross-sectional, correlational analyses. In some cases, the approach can make it difficult to determine the exact direction of the mediation effect. For example, as noted above, it is plausible that correlations between parental communication and alcohol consumption were due to a reaction to parental controls or increased parental awareness of teen drinking. Although our study can be criticized on these grounds, the approach we adopted has some benefits in terms of the economy of data collection given it is the first examination of mediational analyses of variables in a population in which there has been documented high-risk drinking. It also highlights that relationships between parents and teens may not be the same across diverse groups of students. The findings of the present study suggest prospective studies are needed to elucidate the specific nature and timing of parental communication with college athletes to determine whether it is proactive or reactive and whether student athlete drinking is a response to these communications.

In conclusion, the present study identifies parent, peer, and environmental variables associated with increased drinking by collegiate athletes and provides potential avenues for intervening in these areas to reduce student athlete drinking. The study highlights the importance of taking a multidimensional approach when examining factors that mediate high-risk drinking and potential intervention approaches targeting college athletes.

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References

- American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 4. Washington, DC: Author; 1994.
- Baer JS. Effects of college residence on perceived norms for alcohol consumption: An examination of the first year in college. *Psychology of Addictive Behaviors* 1994;8:43–50.
- Baer JS. Student factors: Understanding individual variation in college drinking. *Journal of Studies on Alcohol* 2002;14:40–53.
- Baer JS, Stacy A, Larimer M. Biases in the perception of drinking norms among college students. *Journal of Studies on Alcohol* 1991;52:580–586. [PubMed: 1758185]
- Baron RM, Kenny DA. The moderator-mediator variable distinction in social psychology research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology* 1986;51:1173–1182. [PubMed: 3806354]
- Bartholow BD, Sher KJ, Krull JL. Changes in heavy drinking over the third decade of life as a function of collegiate fraternity and sorority involvement: A prospective multilevel analysis. *Health Psychology* 2003;22:616–626. [PubMed: 14640859]
- Bergen-Cico D. Patterns of substance abuse and attrition among first-year students. *Journal of the First-Year Experience* 2000;12:61–75.
- Borsari B, Carey KB. Effects of a brief motivational intervention with college student drinkers. *Journal of Consulting and Clinical Psychology* 2000;68:728–733. [PubMed: 10965648]
- Brennan AF, Walfish S, AuBuchon P. Alcohol use and abuse in college students: I. A review of individual and personality correlates. *International Journal of Addiction* 1986;21:449–474.
- Carey KB. Situational determinants of heavy drinking among college students. *Journal of Counseling Psychology* 1993;40:217–220.
- Carey KB. Alcohol-related expectancies predict quantity and frequency of heavy drinking among college students. *Psychology of Addictive Behaviors* 1995;9:236–241.
- Caron SL, Moskey EG, Hovey CA. Alcohol use among fraternity and sorority members: Looking at change over time. *Journal of Alcohol and Drug Education* 2004;47:57–66.
- Clapp JD, Lange J, Min JW, Shillington A, Johnson M, Voas R. Two studies examining environmental predictors of heavy drinking by college students. *Prevention Science* 2003;4:99–108. [PubMed: 12751879]
- Collins RL, Parks GA, Marlatt GA. Social determinants of alcohol consumption: The effects of social interaction and model status on the self-administration of alcohol. *Journal of Consulting and Clinical Psychology* 1985;53:189–200. [PubMed: 3998247]
- Damm, J.; Murray, P. Alcohol and other drug use among college student-athletes. In: Etzel, EF.; Ferrante, AP.; Pinkney, JW., editors. *Counseling college student-athletes: Issues and interventions*. Morgantown, WV: Fitness Information Technology; 1996. p. 185–220.
- Dawson DA, Grant BF, Stinson FS, Chou PS. Another look at heavy episodic drinking and alcohol use disorders among college and noncollege youth. *Journal of Studies on Alcohol* 2004;64:477–488. [PubMed: 15378804]
- Dimeff, LA.; Baer, JS.; Kivlahan, DR.; Marlatt, GA. *Brief alcohol screening and intervention for college students (BASICS): A harm reduction approach*. New York: Guilford Press; 1999.
- Eitle D, Turner RJ, McNulty Eitle T. The deterrence hypothesis reexamined: Sports participation and substance use among young adults. *Journal of Drug Issues* 2003;33:193–222.
- Ennett ST, Bauman KE, Foshee VA, Pemberton M, Hicks KA. Parent-child communication about adolescent tobacco and alcohol use: What do parents say and does it affect youth behavior? *Journal of Marriage and Family* 2001;63:48–62.
- Evans M, Weinberg R, Jackson A. Psychological factors related to drug use in college athletes. *The Sport Psychologist* 1992;6:24–41.

- Fromme K, Ruella A. Mediators and moderators of young adults' drinking. *Addiction* 1994;89:63–71. [PubMed: 8148746]
- Graham JW, Marks G, Hansen WB. Social influence processes affecting adolescent substance use. *Journal of Applied Psychology* 1991;76:291–298. [PubMed: 2055870]
- Green EK, Burke KL, Nix CL, Lambrecht KW, Mason DC. Psychological factors associated with alcohol use by high school athletes. *Journal of Sport Behavior* 1995;18:195–208.
- Hartzler B, Fromme K. Heavy episodic drinking and college entrance. *Journal of Drug Education* 2003;33:259–274. [PubMed: 15022860]
- Harvey SJ. Hegemonic masculinity, friendship, and group formation in an athletic subculture. *Journal of Men's Studies* 1999;8:91–125.
- Hawkins JD, Catalano RF, Miller JY. Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: Implications for substance abuse prevention. *Psychological Bulletin* 1992;112:64–105. [PubMed: 1529040]
- Hildebrand KM, Johnson DJ, Bogle K. Comparison of patterns of alcohol use between high school and college athletes and non-athletes. *College Student Journal* 2001;35:358–365.
- Kafka RR, London P. Communication in the relationships and adolescent substance use: The influence of parents and friends. *Adolescence* 1991;26:587–598. [PubMed: 1962542]
- Larimer ME, Anderson BK, Baer JS, Marlatt GA. An individual in context: Predictors of alcohol use and drinking problems among Greek and residence hall students. *Journal of Substance Abuse* 2000;11:53–68. [PubMed: 10756514]
- Larimer ME, Cronce JM. Identification, prevention, and treatment: A review of individual-focused strategies to reduce problematic alcohol consumption by college students. *Journal of Studies on Alcohol* 2002;63(Suppl 14):148–163.
- Larimer ME, Irvine DL, Kilmer JR, Marlatt GA. College drinking and the Greek system: Examining the role of perceived norms for high-risk behavior. *Journal of College Student Development* 1997;38:587–598.
- Larimer ME, Turner AP, Anderson BK, Fader JS, Kilmer JR, Palmer RS, Cronce JM. Evaluating a brief alcohol intervention with fraternities. *Journal of Studies on Alcohol* 2001;62:370–380. [PubMed: 11414347]
- Larimer ME, Turner AP, Mallett KA, Geisner IM. Predicting drinking behavior and alcohol-related problems among fraternity and sorority members: Examining the role of descriptive and injunctive norms. *Psychology of Addictive Behaviors* 2004;18:203–212. [PubMed: 15482075]
- Leichliter JS, Meilman PW, Presley CA, Cashin JR. Alcohol use and related consequences among students with varying levels of involvement in college athletics. *Journal of American College Health* 1998;46:257–262. [PubMed: 9609972]
- Leonard WM II. The influence of physical activity and theoretically relevant variables in the use of drugs: The deterrence hypothesis revisited. *Journal of Sport Behavior* 1995;21:421–434.
- MacKinnon, DP. Analysis of mediating variables in prevention and intervention research. In: Cazares, A.; Beatty, LA., editors. *Scientific methods in prevention research*. NIDA Research Monograph 139. Washington, DC: U.S. Government Printing Office; 1994. p. 127–153.
- MacKinnon DP, Lockwood CM, Hoffman JM, West SG, Sheets V. A comparison of methods to test mediation and other intervening variable effects. *Psychological Methods* 2002;7:83–104. [PubMed: 11928892]
- Marin Institute. Alcohol and sports: An unhealthy mix. 2006. Retrieved April 28, 2006, from http://www.marininstitute.org/alcohol_industry/sports.htm
- Martens MP, Cox RH, Beck NC, Heppner PP. Measuring motivations for intercollegiate athlete alcohol use: A confirmatory factor analysis of the drinking motives measure. *Psychological Assessment* 2003;15:235–239. [PubMed: 12847784]
- Martens MP, Dams-O'Connor K, Duffy-Paiement C, Gibson JT. Perceived alcohol use among friends and alcohol consumption among college athletes. *Psychology of Addictive Behaviors* 2005;20:178–184. [PubMed: 16784364]
- McCabe SE, Schulenberg JE, Johnston LD, O'Malley PM, Bachman JG, Kloska DD. Selection and socialization effects of fraternities and sororities on US college student substance use: A multi-cohort national longitudinal study. *Addiction* 2005;100:512–524. [PubMed: 15784066]

- Meilman PW, Leichliter JS, Presley CA. Greeks and athletes: Who drinks more? *Journal of American College Health* 1999;47:187–190. [PubMed: 9919850]
- National Collegiate Athletic Association. NCAA study of substance use habits of college student-athletes. 2001 Jun. Retrieved February 17, 2006, from http://www.ncaa.org/library/research/substance_use_habits/2001/substance_use_habits.pdf
- Nattiv A, Puffer JC, Green GA. Lifestyles and health risks of collegiate athletes: A multi-center study. *Clinical Journal of Sports Medicine* 1997;7:411–429.
- Nelson TF, Wechsler H. Alcohol and college athletes. *Medicine and Science in Sports and Exercise* 2001;33:43–47. [PubMed: 11194110]
- O'Malley PM, Johnston LD. Epidemiology of alcohol and other drug use among American college students. *Journal of Studies on Alcohol* 2002;63(Suppl 14):23–39.
- Perkins HW. Surveying the damage: A review of research on consequences of alcohol misuse in college populations. *Journal of Studies on Alcohol* 2002;63(Suppl 14):91–100. [PubMed: 11925064]
- Prentice DA, Miller DT. Pluralistic ignorance and alcohol use on campus: Some consequences of misperceiving the social norm. *Journal of Personality and Social Psychology* 1993;64:243–256. [PubMed: 8433272]
- Presley CA, Meilman PW, Leichliter JS. College factors that influence drinking. *Journal of Studies on Alcohol* 2002;63(Suppl 14):82–90.
- Shrout PE, Bolger N. Mediation in experimental and non-experimental studies: New procedures and recommendations. *Psychological Methods* 2002;7:422–445. [PubMed: 12530702]
- Strauss, R.; Bacon, SD. *Drinking in college*. New Haven, CT: Yale University Press; 1953.
- Thombs DL. A test of the perceived norms model to explain drinking patterns among university student athletes. *Journal of American College Health* 2000;49:75–83. [PubMed: 11016131]
- Thombs DL, Hamilton MJ. Effects of a social norm feedback campaign on the drinking norms and behavior of division I student-athletes. *Journal of Drug Education* 2002;32:227–244. [PubMed: 12379053]
- Toomey TL, Wagenaar AC. Environmental policies to reduce college drinking: Options and research findings. *Journal of Studies on Alcohol* 2002;63(Suppl 14):193–205.
- Turrisi R. Cognitive and attitudinal factors in the analysis of alternatives to binge drinking. *Journal of Applied Social Psychology* 1999;29:1512–1535.
- Turrisi R, Jaccard J. Judgment processes relevant to drunk driving. *Journal of Applied Social Psychology* 1991;21:89–118.
- Turrisi R, Jaccard J, Taki R, Dunnam H, Grimes J. Examination of the short-term efficacy of a parent intervention to reduce college student drinking tendencies. *Psychology of Addictive Behaviors* 2001;15:366–372. [PubMed: 11767270]
- Turrisi R, Wiersma KA, Hughes KK. Binge-drinking-related consequences in college students: Role of drinking beliefs and mother-teen communications. *Psychology of Addictive Behaviors* 2000;14:342–355. [PubMed: 11130153]
- Wechsler H, Davenport AE, Dowdall GW, Grossman SJ, Zanakos SI. Binge drinking, tobacco, and illicit drug use and involvement in college athletics: A survey of students at 140 American colleges. *Journal of American College Health* 1997;45:195–200. [PubMed: 9069676]
- Wechsler H, Dowdall GW, Maenner G, Glenhill-Hoyt J, Lee H. Changes in binge drinking and related problems among American college students between 1993–1997: Results of the Harvard School of Public Health College Alcohol Survey. *Journal of American College Health* 1998;47:57–68. [PubMed: 9782661]
- Wechsler H, Kuh G, Davenport A. Fraternities, sororities and binge drinking: Results from a national study of American colleges. *National Association of Student Personnel Administrators* 1996;33:260–279.
- Wechsler H, Molnar BE, Davenport AE, Baer JS. College alcohol use: A full or empty glass? *Journal of American College Health* 1999;47:247–252. [PubMed: 10368558]
- Wilson GS, Pritchard ME, Schaffer J. Athletic status and drinking behavior in college students: The influence of gender and coping styles. *Journal of American College Health* 2004;52:269–273. [PubMed: 15134101]

Wood MD, Read J, Palfai T, Stevenson JF. Social influences and alcohol use and misuse among college students: The mediational role of alcohol outcome expectancies. *Journal of Studies on Alcohol* 2001;63:32–43. [PubMed: 11271962]

Figure 1.
Statistical mediational model.

Table 1

Means and Standard Deviations for Athletes and Nonathletes on Drinking Outcomes

Variable	<i>M</i>	<i>SD</i>
During the past month, number of times drunk		
Athlete	2.70	1.78
Nonathlete	2.25	1.56
In the last 2 weeks, how many times did you have 5 or more drinks in a row?		
Athlete	1.70	2.37
Nonathlete	0.97	1.87
Most number of drinks consumed on any night in the past 3 months		
Athlete	8.03	6.62
Nonathlete	5.94	5.57

Table 2

Correlations Between Mediator Variables

Variable	1	2	3	4	5	6	7	8	9	10
1. Descriptive norms	—	-.593**	.440**	.569*	.436*	.164*	-.140*	.228*	.045	.037
2. Injunctive norms		—	-.317*	-.500*	-.381*	-.119*	.139*	-.160*	.005	-.026
3. Availability of alcohol			—	.404*	.575*	.110*	-.110*	.117*	.060	.061
4. Direct offers of drinks				—	.426*	.202*	-.081*	-.233*	.140*	.093*
5. Perceptions of drinking where student lives					—	.168*	-.098*	.158*	.077*	.076*
6. Frequency of parent communication						—	.317*	.657*	.458*	.477*
7. Physical							—	.293*	.374*	.339*
8. Legal								—	.535*	.543*
9. Social									—	.666*
10. Academic										—

*
 $p < .05$.*
 $p < .01$.

Table 3
Group Effects on Mediators, Mediator Effects on Heavy Drinking, Mediated Effects, and Confidence Intervals (CIs)

Mediator	Athlete		Nonathlete		Group effect on mediator (α)	Mediated effect on outcome (β)	Mediated effect ($\alpha\beta$)	Lower CI of mediated effect	Upper CI of mediated effect	p
	M	SD	M	SD						
Peer norms										
Descriptive norm	7.091	3.802	6.171	3.719	0.952**	0.425**	0.405	0.147	0.451	.002
Injunctive norm	1.063	0.695	1.274	0.658	-0.217**	-2.259**	0.490	0.236	0.759	.001
Environment										
Availability of alcohol	5.366	2.069	4.817	2.106	0.574**	0.449**	0.288	0.117	0.427	.001
Direct offers of alcohol	5.868	4.488	4.559	4.077	1.849**	0.417**	0.563	0.278	0.864	.001
Drinking going on where you live	2.230	1.473	1.828	1.414	0.414**	0.819**	0.339	0.148	0.552	.001
Parent communication										
Overall frequency	3.645	2.761	2.981	2.529	0.683**	0.193**	0.132	0.050	0.247	.001
Physical consequences of alcohol use	2.402	1.062	2.183	1.041	0.223*	-0.352**	-0.078	-0.167	-0.023	.004
Legal consequences of alcohol use	7.293	3.339	6.713	3.254	0.587*	0.166**	0.097	0.012	0.207	.030
Social consequences of alcohol use	3.154	1.696	2.746	1.488	0.412**	0.121*	0.050	0.005	0.147	.019
Academic consequences of alcohol use	1.623	0.987	1.921	0.848	0.208	0.080 ^a	0.017	-0.017	0.080	.307 ^a

^a Effects are nonsignificant.

* $p < .05$.

* $p < .01$.

** $p < .001$.