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Correlates of Protective Behavior Utilization among Heavy-Drinking College Students

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Abstract

Previous studies have suggested that college students who use protective strategies while drinking are at a lower risk for drinking-related consequences. This study evaluated the correlates of protective behavior utilization in a group of 288 heavy-drinking college students. Students who reported heavier drinking were less likely to use protective behaviors, even after adjusting for covariates. Male gender and perceived history of parental alcohol abuse also predicted lower protective behavior score. The most frequently endorsed strategies among females were “Knowing where your drink has been at all times” and “Going home with a friend,” whereas the most frequently endorsed strategies among males were “Knowing where your drink has been at all times” and “Using a designated driver.” For females, the factor structure of the protective behaviors measure was consistent with previous studies; however, for males, the results suggest a four-factor solution. Findings are discussed in terms of their implications on future research and prevention programming.

Keywords

College students; drinking patterns; prevention; alcohol abuse; protective behaviors

1. Introduction

For more than half a century, alcohol abuse among college students has been recognized as a serious public health problem (Johnston, O'Malley, & Bachman, 2002; O'Malley & Johnston, 2002; Perkins, 2002; Straus & Bacon, 1953; Wechsler, Davenport, Dowdall, Moeykens, & Castillo, 1994; Wechsler & Kuo, 2000; Wechsler, Lee, Kuo, & Lee, 2000). Approximately 70% of college students report drinking alcohol in the past month (Johnston et al., 2002) and 40% report engaging in heavy episodic (“binge”) drinking in the past two weeks, defined as five or more drinks for men or four or more drinks for women, in a single occasion (O'Malley & Johnston, 2002). These rates have remained relatively consistent for White men, but may have increased for women and non-White men (Straus & Bacon, 1953; Wechsler et al., 2002b). Previous studies have documented the consequences of heavy drinking both on those who drink heavily, as well as on other members of the college community (Perkins, 2002; Wechsler et al., 1994; Wechsler & Kuo, 2000; Wechsler et al., 2000; Wechsler et al., 2002a). Each year,

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approximately 1400 fatalities, 500,000 unintentional injuries and 70,000 sexual assaults are attributed to college alcohol abuse (Hingson, Heeren, Zakocs, Kopstein, & Wechsler, 2002).

To alleviate the undesirable consequences of drinking, colleges have adopted different preventive approaches. One approach seeks to reduce the amount of alcohol that students are consuming through individual, group, or campus-wide programs. Although empirical support is greatest for individually-focused strategies such as motivational, cognitive behavioral, and skills training interventions (Larimer & Cronce, 2002; Walters & Bennett, 2000), a recent NIAAA report (National Institute on Alcohol Abuse and Alcoholism, 2002) identified a number of promising universal prevention strategies, such as increased enforcement of drinking laws, restrictions on alcohol retail outlet density, increased price of alcohol, and the formation of campus and community coalitions to support policy implementation. To better implement these programs, researchers have identified a number of individual factors that are associated with greater consumption. Among these risk factors are male gender, White race, Greek or athletic affiliation, impulsivity, social support for drinking, and greater access to alcoholic beverages (Baer, 2002; Walters & Baer, 2006; Wechsler, Dowdall, Davenport, & Castillo, 1995).

A second approach focuses on reducing the harms associated with drinking. These efforts may not directly target consumption, but may instead, focus on reducing risk (Marlatt, 1998). Part of this “harm reduction” approach involves the propagation of protective strategies that minimize the negative consequences of drinking. For instance, college students might be encouraged to use a designated driver, to eat food before and while drinking, or to avoid drinking games (American College Health Association, 2003; Martens, Ferrier, & Cimini, 2007; Martens et al., 2005; Martens et al., 2004). These protective behaviors may mitigate the consequences of heavy drinking, partially through reducing alcohol consumption; they may also encourage students to adopt behavioral strategies that help them to drink more safely.

In general, the literature supports the idea that students who utilize protective behaviors are at lower risk of alcohol-related problems (Benton et al., 2004; Martens et al., 2007; Martens et al., 2004), even after controlling for consumption. For instance, Martens et al. (2004) and Benton et al. (2004) found that protective strategies were associated with fewer consequences, after controlling for gender and consumption. Delva et al. (2004) found that protective behaviors were inversely associated with alcohol-related problems for women, but not for men. There is some evidence that male and female students may use different protective behaviors, but otherwise the demography of protective behavior utilization is not well understood, particularly among heavy-drinking students (Delva et al., 2004; Haines, Barker, & Rice, 2006). This study identifies factors that were associated with the adoption of different protective behaviors in a group of heavy-drinking college students, and makes recommendations for implementing protective behavioral messages in prevention programming. We hypothesized that age, gender, race, class, fraternity/sorority membership, dating status, parental history of problem drinking, housing status, athletic participation, participation in an alcohol prevention program, and alcohol consumption would be associated with adoption of protective behaviors. We chose these variables based on the results of past studies focused on protective behaviors (Delva et al., 2004; Haines et al., 2006) as well as more general studies of correlates of college drinking (Wechsler et al., 1995; Wechsler et al., 2002a).

2. Methods

This study used data from a longitudinal study that is investigating the effects of motivational interviewing (MI) and personalized feedback on heavy-drinking college students. For our analyses, we used the baseline information of study participants.

Participants were recruited from a medium sized private university in the southern United States during the Fall of 2006 and Spring of 2007. Participants were at least 18 years old and reported at least one heavy-drinking (“binge”) episode in the past two weeks. Past studies have used similar criteria as a marker of drinking-related risk (Marlatt et al., 1998;Neighbors, Larimer, & Lewis, 2004;Wechsler & Nelson, 2001), though other researchers have noted limitations of the 5/4 “binge” moniker (DeJong, 2001;Weingardt et al., 1998). The project used a variety of methods to inform students of the opportunity to participate, including invitation emails to undergraduate psychology students, brief presentations in undergraduate health and psychology courses, and posting of flyers across campus. We estimate that approximately 1500 students received such an invitation, of which approximately 675 students were potentially eligible for participation in the study (assuming a 45% “binge” drinking rate). For completing the baseline assessment, participants could receive \$20 or psychology extra credit. The project was approved by the Institutional Review Boards of both the University of Texas Health Science Center at Houston and the university from which the study participants were recruited.

For our analyses, we used the following information:

Demographics included gender, age, weight, year in school, race (i.e., White vs. non-White), fraternity/sorority membership, athletic participation, dating status (i.e., single/not dating, single/casual dating, single/exclusively dating), residential status (i.e., fraternity or sorority house, residence hall/dorm, off-campus housing, with parents), and participation in an alcohol education program in the past three months. Perceived history of parental alcohol abuse was assessed by asking students to identify the number of blood relative parents that “were, or have been in the past, problem drinkers or alcoholics” (Project MATCH Research Group, 1997). Since dating status was one of the exposures of interest in this study, we excluded from analyses the small number of students who were married or living with a life partner (5 students) or were engaged (3 students).

Alcohol consumption was assessed with a modified version of the Daily Drinking Questionnaire (Collins, Parks, & Marlatt, 1985). To calculate an estimated peak blood alcohol content (BAC) in the past month, we used the participants' self-reported weight and gender along with the number of drinks and hours spent drinking for the participants' heaviest drinking episode. Participants also indicated the number of times they had engaged in heavy (“binge”) episodes during the past two weeks and past month (i.e., 5 or more drinks for men, 4 or more for women, in a single occasion).

Protective behaviors were measured by the 15-item Protective Behavioral Strategies Survey (PBSS, Martens et al., 2005). The PBSS asks respondents to identify different protective behaviors they might have used in the last three months while they were drinking. Sample items include “Using a designated driver”, “Having a friend let you know when you have had enough”, and “Alternating alcoholic with non-alcoholic beverages.” Respondents rate items on a 5-point Likert scale that ranges from “Never” to “Always.” The PBSS has three subscales: *Limiting Drinking Score* (LDS; e.g., “Determine not to exceed a set number of drinks”), *Manner of Drinking Score* (MDS; e.g., “Avoiding drinking games”) and *Serious Harm Reduction Score* (SHRS; e.g., “Using a designated driver”). For each participant, we calculated subscores as well as the total protective behavior score (TPBS). Reliabilities (Cronbach's alpha) were .86 for the total scale, .81 for LDS, .79 for MDS, and .63 for SHRS, and were very close to those reported by Martens et al. (2005).

3. Results

The sample consisted of 288 participants. Sixty five percent of participants were female and the mean age was 19.8 (SD=2.0) years. Table 1 summarizes the distribution of class,

relationship status, fraternity or sorority membership, presence of at least one parent with a history of alcohol problems, peak BAC in the previous month, and number of binge drinking episodes during the past two and four weeks, for male and female participants. We used chi-square for comparison of categorical variables and student t-tests for comparing continuous variables between male and female students. We used a series of linear regression models to explore the association between different covariates and TPBS, LDS, MDS and SHRS.

Table 2 presents the percent of participants who reported using different protective behaviors “frequently” or more often in the past three months. To be consistent with past studies (Delva et al., 2004; Haines et al., 2006), we used a dichotomous scoring (never, rarely or sometimes use (score \leq 3) vs. frequently or always use (score $>$ 3)). Using this scoring procedure, the most common protective behaviors among female participants were “Knowing where your drink has been at all times” and “Making sure that you go home with a friend,” whereas the most common protective behaviors among male participants were “Knowing where your drink has been at all times” and “Using a designated driver.”

Table 3 compares the total protective behavior score (TPBS) and its three subcategories, i.e. limiting drinking score (LDS), manner of drinking score (MDS) and serious harm reduction score (SHRS), between males and females.

On average, females had significantly higher scores compared to males on the MDS (15.9 vs. 13.9), the SHRS (13.1 vs. 11.3), and the Total score (47.8 vs. 42.7) ($p<.001$ for all comparisons). The gender difference in LDS was not significant (18.8 vs. 17.5, $p=.057$). The first three findings remained significant after using a Bonferroni adjustment to correct for familywise Type I error rate. As examples of items from these scales, females were more likely to endorse the items “Made sure you went home with a friend” (84% vs. 57%, $p=.001$) and “Knew where your drink had been at all times” (94% vs. 77%, $p=.001$), but not more likely to report that they “Used a designated driver.”

To evaluate the association between protective behavior scores and demographic variables, we constructed four linear regression models (Table 4). The first model in Table 4 evaluated the association between TPBS and the following covariates: age, gender, class, fraternity or sorority membership, relationship status, presence of at least one problem drinker parent, living situation, race, athletic participation, participation in an alcohol prevention program in the past three months, peak BAC, and number of heavy-drinking episodes. A total of 281 students contributed data to this analysis. The bivariate association of gender with TPBS remained after adjustment for the previously mentioned covariates; males had significantly lower total scores than females (Table 4). Reporting at least one problem drinker parent in the family was also significantly associated with TPBS. In other words, students who reported having at least one parent with a history of alcohol abuse had lower TPBS scores compared to those without a parental history of alcohol abuse. As expected, those who reported a higher amount of alcohol consumption had significantly lower TPBS scores.

The second model evaluated the association between LDS and the previously mentioned covariates. In this model, only having a problem drinker parent and greater alcohol consumption were significantly associated with a lower LDS score (Table 4)

The third model evaluated the association between MDS score and the previously mentioned covariates. In this model, male gender, older age and greater alcohol consumption were significant correlates of lower MDS score (Table 4). Having a problem drinker parent was not significantly associated with a lower MDS score ($p=0.071$).

The fourth model evaluated the association between SHRS and the previously mentioned covariates. In this model, male gender, older age, and living with parents were significantly

associated with a lower SHRS score. Having a problem drinker parent and living off-campus were not associated with a lower SHRS score.

4. Discussion

This study explored correlates of protective behavior utilization in a group of heavy-drinking college students. In this study, alcohol consumption was the most consistent correlate of protective behaviors, even after adjustment for other covariates. Students who reported a greater peak BAC and more heavy-drinking episodes also reported the least amount of protective behaviors. This finding may be partially attributable to the nature of some protective behavior items that work by encouraging less drinking. For instance, behaviors, such as “setting a drinking limit” and “drinking slowly”, likely contribute directly to lower drinking. However, this relationship held even after adjusting for covariates. Thus, it may be that other individual (e.g., sensation seeking, low harm avoidance) or environmental (e.g., high-risk events) factors that encourage students to drink more heavily, also discourage them from engaging in protective behaviors.

Gender was also a significant predictor of protective behavior utilization, such that female students reported using more protective strategies than did their male counterparts. This is consistent with past studies' findings that female students tend to be more aware of the need for self-protection and hence more likely to use protective behaviors when drinking (Benton et al., 2004; Delva et al., 2004; Haines et al., 2006). Furthermore, many of the individual behaviors varied between male and female students. For example, the most frequently endorsed strategies among females were “Knowing where your drink has been at all times” and “Making sure that you go home with a friend.” The most frequently endorsed strategies among males were “Knowing where your drink has been at all times” and “Using a designated driver.” Also consistent with previous studies (Benton et al., 2004; Delva et al., 2004; Haines et al., 2006), more women reported using social strategies like “Having a friend let you know when you have had enough” and “Going home with a friend.” Encouragingly, both males and females reported a relatively high use of designated drivers, a strategy that has been the focus of recent media campaigns. Although Delva et al. (2004) found that males were slightly less likely to use a designated driver, both Delva et al. (2004) and Haines et al. (2006) suggest that students are relatively aware of and likely to use this important protective strategy.

Interestingly, a high percentage of males endorsed “Knowing where your drink had been at all times,” an item that has traditionally been associated with harm reduction among females. It is possible that women and men understood this question differently; women understood this as a strategy to reduce their chance of receiving a “date rape” drug (i.e., harm reduction), while males understood this behavior as a way to making drinking more convenient (i.e., manner of drinking). Indeed, the PBSS asks students to report behaviors in which they have engaged, but does not specify that they must have done so to intentionally reduce drinking-related risk. If the goal is to determine behaviors in which students have intentionally engaged to reduce their risk, future studies might consider altering the PBSS prompt to “Which of these behaviors have you used to keep yourself safe when drinking?”

Further evidence about the gender differences in perceived meaning of items may be inferred from our attempt to replicate the factor structure underlying the subscales. For female subjects, the scree plot suggested a three-factor solution and the subscales were replicated almost perfectly from Martens et al. (2005). However, for males the scree plot was inconclusive and in the three-factor solution, four LDS items (2, 4, 6, and 10) loaded most heavily on the same factor as SHRS items 1 and 7. (SHRS item 8—knowing where your drink had been at all times—loaded slightly more heavily on the factor identified with MDS.) A four-factor solution (Table 5) suggested dividing the LDS into components (a) mixing nonalcoholic drinks with

alcohol (i.e., items 3, 11, and 12) and (b) planned limits on drinking (i.e., items 2, 4, 6, and 10). For males, the results were more consistent with this interpretation, with the exception of items 2 and 8, which loaded most heavily on the same factor as MDS items. For female subjects, both the three- and four-factor solutions were consistent with their respective proposed subscales. Benton et al. (2004) and Delva et al. (2004) found some evidence that gender moderates the relationship between protective behaviors and adverse consequences. Additionally both found, as we did, that women use protective behaviors more heavily. However, we are not aware of other studies reporting gender differences in the structure of protective behaviors themselves, and thus our results should be interpreted with caution.

Another variable associated with lower protective behavior scores was parental history of problem drinking. Similar to the level of alcohol consumption, our existing data do not allow us to explain the underlying reasons for this association. However, the same factors that lead children of these families to consume alcohol more heavily might also discourage them from using different protective behaviors. For instance, research has identified several heritable traits that seem to predict later risk for alcohol abuse (Cloninger, Sigvardsson, & Bohman, 1996; Schuckit, 1998). In particular, Cloninger and colleagues (1988) found that novelty seeking and low harm avoidance were strongly predictive of early-onset alcohol abuse, a finding that may explain the relationship between genetic risk, drinking, and protective behaviors. Although genetic risk factors are associated with alcohol problems in the general population, they tend not to be consistently related to amount of drinking during the college years (Baer, 2002). However, the results of our study suggest that parental history of alcohol abuse did influence the manner of drinking in this group. Other psychosocial factors such as modeling substance misuse by parents, higher level of tension and anxiety in the household, and having more problem-drinking friends are additional predisposing factors (Chalder, Elgar, & Bennett, 2006; Hussong, Curran, & Chassin, 1998).

Our results have several implications for prevention programming. First, programs should continue to integrate protective behavior strategies into prevention and intervention programs, particularly for high-risk students (Dimeff, Baer, Kivlahan, & Marlatt, 1999; Walters & Baer, 2006). Indeed, Wechsler et al. (1999) found that the greatest harm was attributable to the 19% of students who drank heavily *and* frequently, which argues that programs ought to target this heavy drinking group with additional services. For students such as these, part of the marketing of these programs might include the message that students who drink, but also use protective strategies, can reduce their risk of negative consequences. Interventions that include strategies students already use (e.g., designated driver, knowing where your drink has been) may be more effective, because they are consistent with prevailing norms. At the same time, strategies that students endorse less often (e.g., stopping at a given time, alternating alcoholic and non-alcoholic drinks) may need to be marketed differently so that they are more attractive to students. While some interventions can be implemented during the drinking event (e.g., adding ice to drinks), other strategies (e.g., setting a drinking limit) involve a level of planning that could be the focus of an intervention program.

Second, when considering gender, prevention efforts should continue to promote the use of well accepted strategies such as "Using a designated driver" for both male and female students. However, prevention efforts might place additional emphasis on the social desirability of behaviors that might otherwise be considered a sign of weakness or fear, especially among male students. For instance, to increase utilization of "Having a friend let you know when you have had enough," an intervention for heavy drinking-fraternity males might focus on brotherhood (e.g., looking out for each other). Likewise, to increase "Avoiding drinking games" and "Avoid trying to out-drink others" an intervention for heavy-drinking males might discourage competitive drinking practices.

Finally, in terms of parental history, programs might focus on identifying and intervening with students who have a family history of alcohol abuse. Computer interventions, in particular, could be easily tailored based on this variable. While being at risk for developing future alcohol problems may be only a distant thought in students' minds, an intervention might point out the association between genetic history and the more immediate consequences of alcohol, an association that may be partially alleviated by protective behavioral strategies. Programs can emphasize both reducing the amount of drinking, as well as increasing the use of protective strategies, in order to avoid negative consequences.

This study also evaluated the association between other covariates and protective behavior scores, but we were able to detect only a few significant associations (i.e., age with MDS and SHRS, and living with parents with SHRS). Our lack of additional findings, in addition to some of the different findings between this and previous studies might be attributable to sample limitations. We used a relatively small sample of heavy-drinking students recruited from a single institution, and thus our results may not be generalizable to other populations of students. The wide confidence intervals around almost all beta coefficients are partially a result of our small sample size. Other studies have recruited students from different levels of alcohol consumption (Delva et al., 2004) or from several institutions (Benton et al., 2004; Haines et al., 2006). In addition, our sample was relatively young (mean age of 20) and mostly White (85%). This might partially explain why covariates such as race were not associated with any protective behavior scores, while such an association was reported by Delva et al. (2004). The protective behaviors evaluated in the present study also differed somewhat from those used in some previous studies. For example, Haines et al. (2006) and Delva et al. (2004) did not include "Knowing where your drink has been at all times" and "Making sure that you go home with a friend" as protective behaviors. Nevertheless, the most frequently endorsed behaviors in our study are similar to those reported by Haines et al. (2006) and Delva et al. (2004). Finally, we used a dichotomous scoring procedure to identify behaviors that students reported "frequently" or "always" using behaviors. Had we partitioned the scores in another way, our results may have been somewhat different.

Despite these limitations, this study provides information about correlates of protective behaviors in a group of students who are at risk for alcohol-related problems. Future studies with a larger sample and a more heterogenous population will provide more information with which to further refine interventions targeted at this high-risk group.

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Table 1

Participant characteristics, by gender.

		Female (n=187)	Male (n=101)	p value
Class				0.052
	Freshman	71 (38%)	48 (47%)	
	Sophomore	38 (20%)	23 (22%)	
	Junior	49 (26%)	13 (13%)	
	Senior	27 (15%)	19 (18%)	
Relationship status				0.004
	Single and not dating	40 (22%)	42 (41%)	
	Casual dating	74 (40%)	32 (31%)	
	Exclusive dating	66 (36%)	27 (26%)	
	Engaged or married	5 (2%)	2 (2%)	
Member of a fraternity or sorority		68 (37%)	21 (31%)	0.004
At least one problem-drinker parent		48 (26%)	19 (18%)	0.149
Highest blood alcohol level (mean± SD)		0.15 ± 0.08	0.17 ± 0.11	0.001
Number of heavy-drinking (binge) episodes	During the past two weeks (mean± SD)	2.87 ± 1.71	3.52 ± 1.79	0.58
	During the past month (mean± SD)	3 ± 1.75	3.66 ± 1.86	0.003

Table 2

Percent of participants reporting using protective behavior items often or more frequently, by gender.

Protective Behavioral Strategies Survey items		Female (n=186)	Male (n=102)
1.	Used a designated driver	75%	70%
2.	Determined not to exceed a set number of drinks	38%	34%
3.	Alternated alcoholic and non-alcoholic drinks	22%	23%
4.	Had a friend let you know when you had enough to drink	27%	17%
5.	Avoided drinking games	35%	20%
6.	Left the bar/party at a predetermined time	28%	31%
7.	Made sure that you went home with a friend	84%	57%
8.	Knew where your drink had been at all times	94%	77%
9.	Not drinking shots of liquor	65%	46%
10.	Stopped drinking at a predetermined time	22%	17%
11.	Drank water while drinking alcohol	31%	28%
12.	Put extra ice in your drink	22%	17%
13.	Avoided mixing different types of alcohol	43%	33%
14.	Drank slowly, rather than gulping or chugging	44%	31%
15.	Avoided trying to "keep up with" or "out-drink" others	62%	43%

Table 3
Mean protective behavior subscores and total scores^a, by gender.

	Female (n=187)	Male (n=101)	P value
Limiting drinking score	18.8 (5.8) ^b	17.5 (5.8)	0.057
Manner of drinking score	15.9 (4.1)	13.9 (4.2)	0.000
Serious harm reduction score	13.1 (2.2)	11.3 (2.7)	0.000
Total protective behavior score	47.8 (9.9)	42.7 (10.3)	0.000

^aTotal protective score (TPS) is the sum of all 15 items on the Protective Behavioral Strategies Survey (see Table 2), with the possible range of 15 to 75. Limiting drinking score (LDS) is the sum of items 2, 3, 4, 6, 10, 11 and 12 with the possible range of 7 to 35. Manner of drinking score (MDS) is the sum of items 5, 9, 13, 14 and 15 with the possible range of 5 to 25. Serious harm reduction score (SHRS) is the sum of items 1, 7 and 8 with the possible range of 3 to 15

^bStandard deviations in parentheses.

Table 4
Evaluation of the association between protective behavior scores and other covariates.

	Total protective behavior score			Limiting drinking score			Manner of drinking score			Serious harm reduction score		
	Model 1 β Coefficient	95% CI		Model 2 β Coefficient	95% CI		Model 3 β Coefficient	95% CI		Model 4 β Coefficient	95% CI	
Gender												
Female	-4.40 ^b	-6.77, -2.02		-1.13	-2.55, 0.29		-1.78 ^b	-2.74, -0.82		-1.49 ^b	-2.08, -0.91	
Male	0.38	-0.59, 1.34		0.17	-0.41, 0.74		0.45 ^a	0.06, 0.84		-0.24 ^a	-0.48, 0.00	
Age												
Class												
Freshmen	-0.48	-5.07, 4.11		-0.12	-2.85, 2.62		0.04	-1.82, 1.89		-0.40	-1.53, 0.73	
Sophomore	-2.12	-7.47, 3.23		-2.05	-5.24, 1.15		0.27	-1.90, 2.43		-0.33	-1.65, 0.98	
Junior	0.07	-5.92, 6.07		-0.54	-4.12, 3.04		0.97	-1.45, 3.39		-0.36	-1.84, 1.11	
Senior												
No	-0.76	-3.72, 2.19		-1.02	-2.79, 0.74		0.54	-0.65, 1.74		-0.28	-1.01, 0.44	
Yes	1.38	-1.36, 4.12		0.89	-0.75, 2.52		0.02	-1.08, 1.13		0.47	-0.20, 1.15	
Single, not dating	1.61	-1.26, 4.47		0.93	-0.79, 2.64		0.13	-1.03, 1.29		0.55	-0.15, 1.26	
Single, dating casually												
Single, dating exclusively												
No	-3.55 ^a	-6.17, -0.92		-1.97 ^d	-3.54, -0.40		-0.98	-2.04, 0.08		-0.60	-1.25, 0.05	
Yes	0.00	-5.24, 5.25		-0.15	-3.28, 2.99		0.27	-1.85, 2.40		-0.12	-1.41, 1.17	
On campus/Dorm	-1.55	-5.49, 2.38		-1.06	-3.41, 1.30		0.42	-1.17, 2.01		-0.92	-1.89, 0.05	
Fraternity/sorority	-2.26	-8.04, 3.52		0.08	-3.37, 3.53		-0.91	-3.25, 1.42		-1.43 ^a	-2.85, -0.01	
Off-campus apartment	1.08	-2.09, 4.24		-0.37	-2.26, 1.52		0.91	-0.37, 2.19		0.54	-0.24, 1.32	
Living with parents												
White	-2.58	-6.43, 1.28		-1.65	-3.95, 0.65		-1.18	-2.74, 0.38		0.26	-0.69, 1.21	
Non-white	0.18	-3.21, 3.56		-0.14	-2.16, 1.88		0.80	-0.57, 2.16		-0.48	-1.31, 0.35	
No	-34.77 ^b	-47.62, -21.91		-14.76 ^b	-22.43, -7.08		-14.66 ^b	-19.86, -9.46		-5.35 ^b	-8.52, -2.19	
Yes	-0.89 ^a	-1.62, -0.15		-0.40	-0.84, 0.04		-0.39 ^b	-0.69, -0.10		-0.10	-0.28, 0.08	
Athletic Participation												
Alcohol prevention program												
No												
Yes												
Peak BAC												
Number of binge drinking episodes in past two weeks												

^a p < 0.01

^b p < 0.001

Table 5

Loadings in a four-factor model ^a, by gender.

Item	Factor loadings							
	Females				Males			
	I	II	III	IV	I	II	III	IV
3. Alternated alcoholic and non-alcoholic drinks	-0.01	0.26	0.57	-0.03	-0.08	0.14	0.73	0.00
11. Drank water while drinking alcohol	0.02	-0.11	0.95	-0.04	0.06	-0.03	0.82	-0.04
12. Put extra ice in your drink	0.18	0.01	0.39	0.13	0.12	-0.03	0.37	0.14
10. Stopped drinking at a predetermined time	0.00	0.87	-0.02	-0.09	-0.08	0.86	0.08	-0.18
2. Determined not to exceed a set number of drinks	0.04	0.53	0.14	0.10	0.36	0.28	0.02	0.18
4. Had a friend let you know when you had enough to drink	-0.17	0.50	0.10	0.22	0.05	0.30	0.12	0.20
6. Left the bar/party at a predetermined time	0.09	0.81	-0.13	-0.06	-0.12	0.79	0.05	0.01
5. Avoided drinking games	0.35	0.32	0.02	0.00	0.51	0.08	0.09	-0.15
9. Drank shots of liquor (reverse coded)	0.47	0.14	0.05	-0.08	0.69	-0.12	-0.10	-0.20
13. Avoided mixing different types of alcohol	0.48	0.12	-0.08	0.25	0.70	0.01	0.13	-0.04
14. Drank slowly, rather than gulping or chugging	0.87	-0.03	0.04	-0.12	0.83	-0.06	0.05	-0.04
15. Avoided trying to 'keep up with' or 'out-drink' others	0.75	-0.11	0.03	0.07	0.59	-0.11	0.10	0.18
1. Used a designated driver	-0.15	0.05	0.07	0.66	-0.22	-0.09	0.03	0.94
8. Knew where your drink had been at all times	0.26	-0.07	-0.04	0.45	0.38	0.33	-0.24	0.01
7. Made sure that you went home with a friend	0.03	-0.03	-0.06	0.76	0.27	0.29	-0.11	0.34

^aPrincipal axis factoring with promax rotation.