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Protective Behaviors and High-Risk Drinking Among Entering College Freshmen

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Abstract

Objectives—To explore the use of protective behaviors to reduce risks associated with alcohol consumption among adolescents during the summer preceding college enrollment.

Methods—Survey data were collected in fall 2006 and 2007 that assessed demographic characteristics, drinking behaviors, and use of protective behaviors in the 3 months preceding the survey.

Results—Female participants reported using 4 out of 10 protective behaviors more often than did males, and using protective behaviors was significantly related to fewer negative drinking-related consequences.

Conclusions—Findings highlight potential benefits of using protective behaviors and the need to promote effective behaviors.

Keywords

protective behaviors; harm reduction; college drinking

High-risk drinking among college students has been recognized as a significant public health problem. Four of 5 college students drink alcohol, and half of these engage in heavy episodic drinking.¹⁻⁵ The consequences of high-risk drinking are numerous and undesirable. High-risk drinking among college students has been associated with greater likelihood of negative consequences such as physical and sexual assault, health problems, unsafe and unplanned sexual activity, sexual harassment, impaired sleep and study time, and interpersonal problems.^{3,6-17}

Alcohol use is culturally and socially accepted during the transition from high school to college.² Numerous studies show that late adolescence and early adulthood are the peak time for heavy drinking and alcohol-related problems, along with other substance use and other risky and illegal behaviors.¹⁸⁻²⁰ High school students intending to go to college have lower rates of alcohol and other substance use compared to their noncollege-bound peers. However, in the years immediately following high school, college students have higher rates of alcohol use and frequent heavy drinking, even though they have lower rates of other substance use.¹⁹⁻²¹ This period of initiation and accelerated use is an important time to intervene, as it can affect long-term use and lifelong difficulties.²²

Much of the increase in alcohol use has been attributed to major individual (eg, alcohol expectancies, perceptions of drinking norms) and contextual changes (eg, decreased parental monitoring) that adolescents experience during this transition period.^{23,24} White and colleagues found that leaving home and going to college were significantly associated with increased frequency of alcohol use and heavy episodic drinking during the time between high school and emerging adulthood.²⁴ The increase in high-risk drinking among incoming college students has been attributed to decreases in parental monitoring and perceptions of drinking norms among college students.

Harford et al examined the associations between type of residence, heavy episodic drinking in high school, and alcohol-related problems among college students.²⁵ Students living off campus with their parents reported lower alcohol-related consequences compared to students living in coed or single-gender dormitories. Students living off campus without parental supervision reported the highest probability of drinking and driving, thus highlighting the potential role of parental supervision.

Other studies suggest that individual perceptions and intentions also influence alcohol use during the college transition. White and colleagues found that perceived norms for college-student alcohol use and alcohol-related problems were significant predictors of heavy drinking for both male and female college students.²⁴ Perceptions among those entering college that heavy drinking is normative may contribute to increased drinking during this transition time.

To reduce the negative consequences associated with high-risk drinking, especially during the transition to college, US colleges have implemented a wide range of interventions focusing on the individual, the campus as a whole, and the surrounding communities. Researchers have begun to focus on harm reduction approaches as one type of these interventions. Rather than trying to eliminate high-risk drinking, harm reduction approaches encourage the use of protective behaviors that limit alcohol consumption and minimize associated harms. These protective behaviors include, but are not limited to using a designated driver, pacing one's drinks, and avoiding drinking games. It is expected that

these behaviors may reduce the negative effects of drinking by limiting the amount of alcohol consumed or by promoting safer behaviors while drinking (eg, use of designated drivers).²⁶

Research focused on the relationship between protective behaviors and drinking outcomes has recently begun to emerge. Research among college students has shown a strong link between the use of protective behaviors and level of alcohol consumption²⁷ as well as decreased negative consequences (even while controlling for amount of consumption).^{28–31}

Patterns of alcohol consumption and use of protective behaviors among college students vary by gender. Although drinking rates among females have been increasing,³ males continue to report higher levels of alcohol consumption than do females.³² College females are, however, more likely to report using protective behaviors than are college males.^{28,29,31,33}

Although research has increasingly focused on understanding the use of protective behaviors among college students, little is known about the use of these protective behaviors among adolescents prior to entry into college. Whether college students begin using these strategies after they enter college when alcohol consumption typically increases or whether the use of these behaviors begins during high school is unknown. Understanding the origins of these behaviors may provide insight into when and what types of interventions should be implemented in order to facilitate the adoption of protective behaviors among adolescent drinkers for harm reduction.

The goals of this study were to (1) identify the frequency with which adolescents engaged in protective behaviors during the summer preceding college entrance, (2) understand the factors associated with the use of protective behaviors within this population, and (3) explore how the use of protective behaviors was related to alcohol consumption and the negative consequences of drinking for males versus females.

METHODS

Participants and Procedures

Data were collected as part of a pilot intervention study in 2006 in a southeastern US university and a follow-up study in 2007 designed to decrease high-risk drinking and negative consequences among first-year college students. Baseline data were collected on the day after students moved into their residence halls and one day before classes began in the fall semester. Participants were told that the university was interested in learning about effective alcohol intervention programs and that they were being asked to complete a confidential survey with questions about alcohol use, alcohol expectancies, and alcohol-related consequences. The self-administered survey took approximately 30 minutes to complete, and participants were entered into a drawing for a chance to win one of 20 iTunes gift cards. The protocol was approved by the university institutional review board.

Eight hundred twenty entering first-year students residing in 2 residence halls, one male and the other female, were eligible to participate in the fall 2006 pilot study. Approximately 71% of these students completed the survey (n=585). In the following year, 818 entering first-year students living in the same 2 residence halls were eligible to participate in the fall 2007 study, of which 68% completed the survey (n=558). From a combined sample (N=1143 for both years), only self-reported drinkers were included in the analysis (n=777) whereas self-reported abstainers and participants who had never tried alcohol were excluded. Three observations having missing values on more than 2 protective behavior items were excluded from the analysis, resulting in a sample size for analysis of 774.

Measures

Self-reported drinking status—Participants were asked to identify their current alcohol usage. Response options were “I have never tried alcohol before”; “I am an abstainer”; “I am a light, social, nonproblem drinker”; “I am a moderate, social, nonproblem drinker”; “I am a heavy, nonproblem drinker”; and “I am a heavy problem drinker.” Because the goal of this study was to determine whether those who currently drink alcohol also use certain behavioral strategies to protect themselves against negative consequences, we chose to include self-reported drinkers; those who reported never having tried alcohol or being an abstainer were excluded. Those who responded that they were a light, moderate, or heavy drinker were included in the subsequent analyses and were considered as one group: current drinkers.

Protective behaviors—Protective behaviors were measured by 10 items drawn from the National College Health Association Assessment.³¹ Participants were asked: “Please indicate how often you did the following things while drinking in the past 3 months.” The 10 items are outlined below in Table 2. Response options were “never” (1), “rarely” (2), “sometimes” (3), “usually” (4), and “always” (5).

Alcohol consumption—We assessed how often participants drank alcohol in the last 3 months and how many drinks they consumed in a typical drinking day. Values were assigned to the frequency of drinking corresponding to the number of times participants drank alcohol in a week (less than once a month = 0.1, once a month = 0.25, 2–3 times a month = 0.625, once a week = 1, twice a week = 2, 3–4 times a week = 3.5, 5–6 times a week = 5.5, every day = 7). Participants indicated the number of drinks consumed on a typical drinking day by selecting one of 9 categories, and midpoint values were assigned to the quantity of drinks (1–2 drinks = 1.5, 3–4 drinks = 3.5, 5–6 drinks = 5.5, 7–8 drinks = 7.5, 9–11 drinks = 10, 12–15 drinks = 13.5, 16–18 drinks = 17, 19–24 drinks = 21.5, 25 or more drinks = 25). The typical number of drinks consumed per week was approximated as frequency multiplied by quantity.

Alcohol-related negative consequences—The Rutgers Alcohol Problem Index (RAPI) was used to assess negative consequences due to drinking during the past 3 months. The RAPI is a 23-item scale that measures problem drinking among adolescents and young adults by the number of occurrences of negative consequences. A 5-point Likert scale was used (0 = never, 1 = 1 to 2 times, 2 = 3 to 5 times, 3 = 6 to 10 times, 4 = more than 10 times), and responses were summed across items to get a total RAPI score, as is standard when using this scale. This scale has demonstrated good convergent and discriminant validity as well as good internal consistency.³⁴

Demographic characteristics—Participants reported gender (coded male/female), age (continuous), race (coded white/nonwhite), Hispanic ethnicity (coded yes/no), and attendance at religious services in the past 3 months (coded yes/no).

Statistical Analyses

To explore a factor structure for protective measures in our sample, exploratory factor analyses (EFA) were performed using SAS for Windows version 9.1 (SAS Institute Inc., Cary, NC). Several criteria were used to determine the number of factors: the scree test,³⁵ retaining factors to the left of the break in the scree plot; the Kaiser criterion,³⁶ retaining factors with eigenvalues greater than one; parallel analysis,³⁷ retaining factors with eigenvalues greater than the corresponding eigenvalues of a simulated data set; the proportion of the total variance explained by each factor; and Cronbach’s coefficient alpha.³⁸ All of these indicated that a single factor was sufficient for females. For males, all

tests indicated a one- or possibly a 2-factor solution; however, the first factor alone accounted for 98% of the variance (eigenvalue = 3.41), and the second factor had a relatively small eigenvalue of 0.63; therefore, one factor was retained for males. Loadings ranged from 0.22 to 0.68 for males and 0.44 to 0.74 for females with internal consistency of $\alpha=.75$ for males and 0.83 for females. Although 3 of the items for males had factor loadings less than our desired loading rule of 0.40 (0.22 for “eat before drinking”, 0.35 for “switch between alcoholic and nonalcoholic drinks” and “drink an alcohol look-alike”), all 10 items were retained so that direct comparisons to females could be made for theoretical considerations. A single protective-behaviors score was created using the sum of the 10 items ($M=29.98$, $SD=6.25$, range=10 to 50 for males; $M=32.81$, $SD=7.35$, range=9 to 50 for females).

Participants reporting using each protective behavior at least sometimes (ie, sometimes, usually, or always) were compared to those reporting never or rarely using each protective behavior. Chi-square tests were performed to determine gender differences in usage of each of the 10 protective behaviors, and a t-test was performed to test the gender difference in the summed protective-behaviors score. We desired a familywise significance level of .05 for the 10 chi-square tests, so correlations with P-values less than $.05/10=.005$ were considered statistically significant.

Multivariate linear regression analyses were performed in SAS with the summed protective-behaviors score as the response. Separate models were fit for males and females using a backward elimination process with a P-value cutoff of 0.10. Possible predictors in the model were attendance at religious services, age, the typical number of drinks consumed in a week, and indicators for white race, Hispanic ethnicity, and year of survey.

In the current sample, the RAPI had good reliability ($\alpha=0.88$ for males, 0.85 for females). Spearman correlations were computed to test associations between RAPI and each of the 10 protective behaviors. We desired a familywise significance level of .05 for the 10 tests conducted for each gender, so correlations with P-values less than $.05/10=.005$ were considered statistically significant.

Models for RAPI score with protective behaviors, frequency of attendance at religious services, race, ethnicity, age, data collection year, and number of drinks were fit separately by gender. RAPI scores were nonnormal ($P<.001$ for the Shapiro-Wilk statistic), with 20% of males and 24% of females having a score equal to zero. Therefore, zero-inflated negative binomial models were used, which take into account excess zeros in the data. The Akaike and Bayesian information criteria for both males and females indicated that these models were substantially improved over ordinary least squares models with all potential predictors included, and the zero-inflation term was significant ($P=.0007$ for males and $P=.0001$ for females) using a Vuong test. A backward elimination selection process was used to eliminate nonsignificant predictors, with the protective-behaviors composite score forced into the models at each step.

Scatter plots of the protective-behaviors composite score and RAPI by weekly drinks indicated several outliers that might influence the functional forms of those relationships. To identify statistically significant outliers, extreme studentized deviate tests were performed for each gender.³⁹ For males, 4 observations were identified as extreme outliers in weekly drinks at the $P=.01$ level (number of drinks = 74.25, 75.25, 94.5), and 2 were identified for females (number of drinks = 119, 175) and were omitted from the models predicting protective behaviors and RAPI.

RESULTS

Over 68% (N=774) of the sample reported being current drinkers, with a mean age of 17.94 years (SD=0.38). The majority of the sample reported being non-Hispanic whites, and 55% were female. Males and females reported different frequencies of alcohol consumption. A higher percentage of males (19.2%) than females (16.0%) reported drinking twice a week, and a higher percentage of males (14.0%) than females (8.7%) reported drinking once a week. Males reported drinking a higher number of drinks per week (M=11.14, SD=14.77) than did females (M=7.01, SD=13.13). RRAPI scores also differed by gender (Wilcoxon rank sum P=.007). Males reported higher scores (M=5.92, SD=7.05) than did females (M=4.58, SD=5.52). See Table 1 for sample demographics and descriptions of drinking behaviors.

Analyses of the use of protective behaviors by gender revealed important differences in the use of protective behaviors between males and females. Significantly more females than males used 4 of the 10 protective behaviors sometimes or more often, and females (M=32.81, SD=7.35) had a significantly higher average summed protective-behaviors score than that of males (M=29.98, SD=6.25), P<.0001 (Table 2).

Males and females also showed differences in which predictors were associated with use of protective behaviors. In the multivariable regression model for males, those who completed the survey during the 2006 pilot year ($\beta=-1.47$, P=.02) and those who drank more drinks per week ($\beta=-0.22$, P<.0001) were more likely to report a lower composite protective-behaviors score. In the model for females, drinking more drinks per week ($\beta=-0.34$, P<.0001) predicted a lower composite protective-behaviors score, and being older ($\beta=1.94$, P=.02) predicted a higher composite protective-behaviors score.

The association between protective behaviors and negative consequences revealed that higher composite protective-behaviors scores predicted lower RAPI scores for both genders, but the relationship was significant only for females (Incidence rate ratio (IRR) =.99, P=.265 for males; IRR=.95, P<.001 for females). More drinks per week predicted higher RAPI scores (IRR=1.02, P<.001 for males; IRR=1.02, P=.001 for females). For males, older age at college entrance predicted lower RAPI scores (IRR=.75, P=.03). For females, attending religious services predicted higher RAPI scores (IRR=1.51, P=.005). For both males and females, number of drinks was the only significant predictor of zero-inflation: each additional drink per week decreased the probability of having a "0" RAPI score (odds ratio (OR) =.46, P=.003 for males; OR=.18, P<.001 for females).

In addition to examining the relationship between the protective-behaviors composite score and negative consequences, we also investigated the correlations between each type of protective behavior and RAPI scores. Our intent was to explore whether some behaviors "worked" better than others and were thus correlated with fewer negative outcomes. Results revealed that some strategies, such as choosing not to drink alcohol, using a designated driver, keeping track of number of drinks, pacing oneself, avoiding drinking games, and drinking an alcohol look-alike, were significantly associated with lower RAPI scores for both males and females. However, for females, 3 additional strategies, switching between alcoholic and nonalcoholic drinks, determining not to exceed a set number of drinks, and having a friend let them know when they have had enough were also significantly correlated with lower RAPI scores (Table 3).

DISCUSSION

Results from this study extend findings from research with college students to a sample of high school graduates who are college bound. Even before students begin their college

career, adolescents engage in high-risk drinking. Over two thirds of the participants in our sample described themselves as being a current drinker. Additionally, during the 3 months preceding the survey, drinkers in our sample reported drinking an average of approximately 9 drinks per week.

As in other studies, frequency of alcohol use (eg, drinks per week) was a strong predictor of alcohol-related negative consequences.²⁸ We also found significant gender differences in alcohol use and negative consequences. Females reported fewer drinks per week and fewer negative consequences than did males.

Replicating the findings of previous studies with college students, females were more likely to use protective strategies than were males.^{29,33} Our findings also revealed that females were more likely to use 4 out of the 10 protective strategies, including determining in advance not to exceed a set number of drinks, choosing not to drink, having a friend let them know when they have had enough, and drinking an alcohol look-alike. These types of behaviors may be planned by women prior to entering into a situation involving alcohol. In a qualitative study of the use of protective behaviors, Howard and colleagues (2007) found that women highlighted the importance of developing a plan for the night.⁴⁰ Their plans often included presetting limits on alcohol consumption and ensuring a friend monitored their consumption. These strategies are similar to those reported more often by women in our survey and highlight the importance of planning for women.

Results from this study extend the growing body of literature that identifies a link between the use of protective behavioral strategies and reduced alcohol-related consequences among college students.^{28,29,41} Similar to findings from Delva and colleagues (2004), we found the association between drinking strategies and the consequences of drinking was significant for females but not for males.²⁹ Some have suggested that due to the threat of sexual assault, females are more vigilant and aware of the need for protecting themselves.²⁹ Our results also revealed that females use more behaviors overall and that more behaviors used by females are associated with fewer negative consequences. However, for males, this relationship was not significant. Future research is necessary to explore this lack of association for males and determine how to increase the effectiveness of males' use of protective behaviors.

Our results also revealed that some individual strategies were more strongly correlated with reductions in negative consequences than others for both males and females, including choosing not to drink alcohol, using a designated driver, keeping track of number of drinks, pacing oneself, avoiding drinking games, and drinking an alcohol look-alike. However, fewer than half of the participants reported avoiding drinking games, and only about a third of females and one quarter of the males drank an alcohol look-alike. Although these more effective behaviors are less frequently used among college student drinkers, our findings suggest that these behaviors are working for those who do use them, and future prevention activities should focus on these promising strategies.

Our study reveals that even prior to entry into college life, adolescents are likely to employ a variety of protective behaviors. For females, the use of protective behaviors was significantly related to experiencing fewer negative consequences, even while controlling for alcohol consumption. The use of protective behaviors was also more common among females than males, suggesting the need for prevention activities targeting males. These findings also suggest the potential value of prevention activities targeting students prior to entry into college in order to maximize students' use of these behaviors. One potential avenue would be during student orientation programs, which are typically held at some point during the summer preceding college entry. This would provide an opportunity to reinforce

those protective behaviors that adolescents appear to already be using and encourage the use of less commonly used protective behaviors. Future research is needed to test the efficacy of this kind of intervention.

Findings from this study should be interpreted with caution given the cross-sectional nature of the data. As suggested by Benton and colleagues (2004) it may be the case that students who experience negative consequences question the effectiveness of protective behaviors, resulting in less usage.²⁸ Future research should investigate the use of protective behaviors over time to better understand the directionality of this relationship. A second limitation of our measurement of protective behaviors was the use of only 10 items. Adolescents may use additional behaviors that we have yet to measure. In their development of a protective behaviors scale, Martens and colleagues (2005) identified 15 behaviors used by college students, 5 more than were assessed in this study.²⁷ Qualitative studies would be helpful to elucidate other strategies used by this population. Additionally, research has shown that precollege and college students show variations in drinking behaviors based on region of the country, type of institution (public vs private; elite status), and demographic factors including race/ethnicity (for a review see Wechsler and Nelson, 2008).⁴² We suggest that future research be conducted with a broader population to determine how these variables may impact adolescents' use of protective behaviors.

In conclusion, these findings highlight the potential success of harm reduction approaches to the problem of high-risk drinking among adolescents from use of protective behaviors. Prior to entry into college, a significant number of adolescents reported employing protective behaviors, and the use of protective behaviors was inversely related to experiencing negative consequences. However, this inverse relationship between protective behaviors and drinking consequences was significant only for females. Because those about to enter college, just like those already in college, are unlikely to respond to abstinence messages, harm reduction approaches, including the use of protective behaviors, hold promise.⁴³ However, future research is needed to clarify the directionality of the relationship between using protective behaviors and experiencing negative consequences. Additional research should also compare the effectiveness of different protective strategies to permit future prevention activities to focus on the more efficacious behaviors.

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Table 1

Demographic and Behaviors Characteristics of Student Drinkers (N=774)

Characteristic/Behavior N (%) or Mean (SD)	All	Males	Females
Age	17.94 (0.38)	17.98 (0.37)	17.91 (0.39)
Race			
White	694 (89.7%)	310 (88.8%)	384 (90.4%)
Black or African American	25 (3.2%)	8 (2.3%)	17 (4.0%)
American Indian or Native American	2 (0.3%)	1 (0.3%)	1 (0.2%)
Asian or Pacific Islander	8 (1.0%)	4 (1.2%)	4 (0.9%)
Multiracial	6 (0.8%)	5 (1.4%)	1 (0.2%)
Other	5 (0.7%)	4 (1.1%)	1 (0.2%)
Missing	34 (4.4%)	17 (4.9%)	17 (4.0%)
Ethnicity			
Hispanic or Latino Origin	12 (1.6%)	7 (2.0%)	5 (1.2%)
Attendance at Religious Services in Past 3 Months	658 (85.0%)	290 (83.1%)	368 (86.6%)
RAPI	5.18 (6.29)	5.92 (7.05)	4.58 (5.52)
Summed Protective-Behaviors Score	31.53 (7.01)	29.98 (6.25)	32.81 (7.35)
Frequency of Alcohol Consumption			
less than once a month	126 (16.3%)	44 (12.6%)	82 (19.3%)
once a month	88 (11.4%)	37 (10.6%)	51 (12.0%)
2–3 times a month	208 (26.9%)	92 (26.4%)	116 (27.3%)
once a week	86 (11.1%)	49 (14.0%)	37 (8.7%)
twice a week	135 (17.4%)	67 (19.2%)	68 (16.0%)
3–4 times a week	94 (12.1%)	43 (12.3%)	51 (12.0%)
5–6 times a week	27 (3.5%)	14 (4.0%)	13 (3.1%)
every day	9 (1.2%)	3 (0.9%)	6 (1.4%)
missing	1 (0.1%)	0	1 (0.2%)
Number of drinks on typical drinking day	5.04 (3.14)	6.32 (3.46)	3.99 (2.40)
frequency			
1–2	162 (20.9%)	53 (15.2%)	109 (25.7%)
3–4	236 (30.5%)	63 (18.1%)	173 (40.7%)
5–6	175 (22.6%)	74 (21.2%)	101 (23.8%)
7–8	97 (12.5%)	67 (19.2%)	30 (7.1%)
9–11	76 (9.8%)	69 (19.8%)	7 (1.7%)
12–15	20 (2.6%)	19 (5.4%)	1 (0.2%)
16–18	3 (0.4%)	1 (0.3%)	2 (0.5%)
19–24	1 (0.1%)	1 (0.3%)	0
25 or more	1 (0.1%)	0	1 (0.3%)

Characteristic/Behavior N (%) or Mean (SD)	All	Males	Females
missing	3 (0.4%)	2 (0.6%)	1 (0.2%)
Typical number of drinks per week	8.87 (14.04)	11.14 (14.77)	7.01 (13.13)

Table 2

Rate of Frequent Use of Protective Behaviors (Sometimes, Usually, or Always) By Gender

Protective Behavioral Strategies Survey Items	Percent of Males (n= 351)	Percent of Females (n= 426)	P-value
1. Switch between alcoholic and nonalcoholic beverages	54%	61%	.0405
2. Determine, in advance, not to exceed a certain number of drinks	49%	60%	.0018
3. Chose not to drink alcohol	67%	78%	.0004
4. Use a designated driver	92%	94%	.2466
5. Eat during or before drinking	94%	95%	.9906
6. Have a friend let you know that you've had enough	53%	67%	.0001
7. Keep track of how many drinks you were having	79%	82%	.2161
8. Pace your drinks	77%	84%	.0153
9. Avoid drinking games	42%	49%	.0353
10. Drink an alcohol look-alike (nonalcoholic beer, punch) juice, or water	23%	37%	<.0001
Total Protective-Behaviors Score (mean & SD)	29.98 (6.25)	32.81 (7.35)	<.0001

Table 3

Spearman Correlations Between Protective Behaviors and RAPI for Males and Females

Protective Behavioral Strategies Survey Items	RAPI	
	Males N = 349	Females N = 425
1. Switch between alcoholic and nonalcoholic beverages	0.0004	-0.19 **
2. Determine, in advance, not to exceed a certain number of drinks	-0.08	-0.23 **
3. Chose not to drink alcohol	-0.34 **	-0.38 **
4. Use a designated driver	-0.29 **	-0.20 **
5. Eat during or before drinking	-0.05	-0.08
6. Have a friend let you know that you've had enough	-0.10	-0.15 *
7. Keep track of how many drinks you were having	-0.24 **	-0.34 **
8. Pace your drinks	-0.29 **	-0.37 **
9. Avoid drinking games	-0.23 **	-0.42 **
10. Drink an alcohol look-alike (nonalcoholic beer, punch) juice, or water	-0.18 *	-0.33 **

*
P<.005**
P<.0001