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ENVIRONMENTAL PREDICTORS OF HEAVY EPISODIC DRINKING

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ABSTRACT

This study examined the relationship between environmental characteristics and heavy episodic drinking by examining college students' last drinking events. For this study, 409 undergraduate students attending a large public university were randomly selected. Students were asked to report on their last drinking event within the 30-day period prior to being surveyed. There were 274 drinking events analyzed. Bivariate analyses and multiple logistic regression analysis were used to identify contextual factors predictive of heavy episodic drinking in specific drinking events. Drinking with friends, drinking beer and hard liquor, and having many people intoxicated at an event were predictive of heavy episodic drinking events. Dating events were protective of heavy episodic drinking. Implications for future research and prevention are discussed.

Key Words: College students; Drinking contexts; Heavy episodic alcohol consumption.

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Alcohol use by college students has long been a concern in the United States (1). Several recent large, national epidemiological studies have examined heavy episodic drinking (i.e., 5 or more drinks in one sitting for men, 4 or more for women, or 5 drinks in single setting) among college students (2–6). As noted by Presley and associates (5), such drinking is associated with a variety of negative consequences, ranging from mild (hangovers) to severe (suicide attempts). Although these studies have identified demographic characteristics associated with heavy episodic drinking (3, 4), little research has examined the environmental characteristics associated with drinking contexts common to college students. Research into environmental factors related to alcohol consumption is especially important given the current popularity of environmental approaches to alcohol prevention on college campuses (7).

In a recent study, Clapp, Shillington, and Segars (8) examined contexts of heavy episodic drinking. They found heavy episodic drinking contexts were almost evenly split between public and private contexts, and that over half of all heavy drinking events resulted in some type of alcohol-related problem. Their study, however, did not assess alcohol consumption as it relates to various contexts. All the drinking events examined in the Clapp et al. (8) study were heavy episodic drinking events. Using environmental- and individual-level variables reported for specific drinking events, this study builds on their work by analyzing contextual predictors of heavy episodic drinking.

More specifically, we address the following research question: Which environmental and individual factors contributed to students' heavy episodic drinking during their last drinking events? By addressing this question, it is hoped that the present study will contribute to the college alcohol prevention field by identifying specific factors related to heavy episodic alcohol consumption within specific contexts. Such information should be useful to prevention professionals working with college students. In addition, the study should be interesting to researchers in the field of college alcohol use.

DRINKING AMONG COLLEGE STUDENTS

Existing Studies

Presley and colleagues (5) presented data collected between 1990 and 1992 from 108 colleges and universities (N = 45,000 students), a study funded by the U.S. Department of Education's FIPSE AOD (alcohol and other drug) prevention program. Within this sample, 83.5% of the respondents reported drinking alcohol at least once in the past year; there was virtually no difference in prevalence by gender. AOD-related problems reported by respondents ranged from having a

hangover (59.8% at least once) to attempting suicide (<1%). Men reported higher frequencies of problems than did women across all problem categories.

Several recent college alcohol use studies have examined heavy episodic or "binge" drinking and its correlated problems (2, 9, 10). These studies indicated that the prevalence of heavy episodic drinking among college students in the United States is moderately high. The recent prevalence of heavy episodic drinking among college students has been reported by over two-fifths of those surveyed (3, 9).

Environmental Characteristics

Much of the extant literature concerning college students' drinking behaviors has focused on individual characteristics of drinkers as they relate to alcohol consumption and problems. A few studies of drinking contexts and college students have begun to examine environmental factors related to heavy episodic drinking (8, 11–13).

Drinking contexts have been conceptualized as where one drinks, with whom one is drinking, and when one drinks (14). Underlying this conceptualization is the notion that individuals interact with their environment, and this interaction influences drinking behavior (15). Consistent with this conceptual approach, Jessor (16) identified five measurable aspects of drinking contexts: (a) location of the drinking event, (b) demographic/descriptive characteristics of the event and its participants, (c) the meanings associated with drinking contexts, (d) abstract dimensions of events such as social controls and norms, and (e) personal perceptions associated with the context.

As noted above, little research has focused on drinking contexts frequented by college students. Kraft (13) examined alcohol consumption patterns, related problems, and contexts of drinking at one East Coast university in the late 1970s. He reported that respondents tended to drink with friends, on weekends, and at parties, while the heaviest drinkers often patronized bars. With increased frequency of attendance at parties or bars, Kraft found increased frequency of self-reported problem behaviors such as driving drunk, academic problems, belligerence, job-related problems, vandalism, and trouble with authorities. In a study of drinking contexts frequented by college females, Hunter (11) reported that female college students drank more often at parties and in bars than in any other contexts.

In a recent study, Clapp and associates (8) were able to collect detailed information from 110 heavy episodic drinkers about their most recent heavy drinking event. Slightly less than half (47.3%) of these events resulted in a self-reported problem for the drinker. Respondents typically reported that their last heavy episodic drinking event was large (median = 10 people), lasted slightly

more than 5 hours, and was on a weekend. On average, students reported drinking slightly more than 8 drinks (standard deviation [SD] = 3.0) on the last heavy episodic drinking event. Men (55.5%) reported more heavy episodic drinking events than did women (44.5%). Furthermore, it was also found that parties, dates, and socializing were the most common occasions associated with respondents' last heavy drinking events. These events were almost evenly split between public (42.2% bars and restaurants) and private (43.1% homes) contexts, with women drinking slightly more in a public setting than in a private setting. In their most recent heavy episodic drinking event, students most often drank with friends (either from school or not) and their partner/spouse. Most events had food and nonalcoholic beverages available, but more than two-thirds of events also had illicit drugs available.

METHODS

This relational study uses survey data collected in 1999 at a large urban public university in southern California. A university-based social science research laboratory administered 409 telephone interviews of randomly selected undergraduate students. Given the size of the population at the study university (N = 24,000), this sample size allows for a 95% level of confidence (±3.5) when estimating population parameters. Confirmed students refusing to participate in the study (4.9% of all contacted students) were randomly replaced. The average interview took 18.8 minutes to complete (SD = 6.03). All interviews were completed in the spring semester of 1999. Table 1 presents the characteristics of the sample and the undergraduate student population at the study university. As can be seen in the table, the study sample slightly overrepresents white students and older students.

Instrument

An original interview schedule was developed for this study. The instrument included several items from the short form of the Core survey (5), including measures of AOD use and related problems. Presley and associates (5) established the psychometric properties of the Core survey. In addition to the standard questions taken from the Core survey, a series of questions concerning alcohol promotion were added to the survey. The interview protocol also included several items to measure contexts of student drinking (see Ref. 8). Several of the context items were drawn from the College Alcohol Risk Assessment Guide (17) and were used in the study by Clapp et al. (8). Finally, several original drinking context

Table 1. Demographic Characteristics of the Sample and the Population

Characteristic	Population		Sample	
	N	(%)	*N*	(%)
Gender				
Male	10,727	(44.2)	179	(43.8)
Female	13,549	(55.8)	230	(56.2)
Ethnicity				
American Indian	244	(1.0)	1	(.2)
African-American	1278	(5.3)	30	(7.4)
Hispanic	4996	(20.6)	55	(13.4)
Asian/Pacific Islander	3653	(15.1)	41	(10.1)
White	10,766	(44.3)	264	(65.0)
Other	3339	(13.8)	15	(3.7)
Age (years)				
Mean	23.8		25.9	
Median	22.2		24.0	

items were included in the interview schedule. The interview protocol was pilot tested and used in an earlier telephone survey in 1998.

Measures

Heavy Episodic Drinking

The dependent measure used in this study concerned whether a drinking event was a heavy episodic event. Consistent with the studies of Johnston, O'Malley, and Bachman (18) and Presley et al. (5), we defined heavy episodic drinking as 5 or more drinks in a single setting. A drink was defined as 1 beer, 1 glass of wine, 1 mixed drink, or 1 shot of spirits. This variable was coded 0 = no and 1 = yes and was based on a respondent's last drinking experience in the 30 days prior to being surveyed.

Environmental Variables

The study included several dummy coded variables that reflected the social and environmental characteristics of the event. These included the following variables (1 = yes): (a) whether roommates were present, (b) whether school friends were present, (c) whether family members were present, (d) the type of beverages

consumed (beer, wine, spirits, mixed drinks), (e) whether food was available, (f) whether nonalcoholic beverages were available, (g) whether other people at the event were intoxicated, (h) whether a bartender served all the drinks, (i) whether the respondent smoked marijuana, (j) whether illicit drugs were available, (k) whether alcohol was provided, (l) whether the event was "bring your own booze" (BYOB), and (m) whether drinking games were played at the event.

Control Variables

Using literature that reported on college student alcohol consumption patterns (5) as a guide, we controlled for the following demographic variables: age (<21 years, 21 years and older) and gender (males = 1). Small sample sizes and listwise deletion of cases with missing values precluded the inclusion of race/ethnicity and fraternity/sorority membership variables in bivariate and multivariate analyses. However, we did include a measure of 30-day drinking prevalence (number of days consuming alcohol) as a control variable in our multivariate analysis.

Analysis Strategy

We conducted bivariate analyses of individual (control) and environmental characteristics as they related to heavy episodic drinking. Given the exploratory nature of the study and the number of dichotomous variables included in the study, we used a stepwise multiple logistic regression model for our multivariate analysis. All significant bivariate predictors of heavy episodic drinking were included in the model except the marijuana variable and the drinking games variable. Although clinically important, these variables did not have adequate distributions for inclusion in the regression model. That is, they had few positive cases, and a high percentage of those cases was also heavy episodic drinking cases. All analyses were conducted using SPSS version 9 (SPSS, Chicago).

RESULTS

Of the 272 drinking events examined here, 51.5% (n = 140) were events in which the respondent reported heavy episodic drinking. Approximately 73% (n = .198) of these events were on weekends. The mean number of drinks consumed across events was 5.8 (SD = 4.7). On average, each event lasted 3.9 hours (SD = 2.8), and 95% of all events started at some time in the afternoon or evening.

Events varied in size from respondents drinking alone (1.8%, $n = 5$) to events with over 700 people present ($n = 1$). On average, events had 31.3 attendees (SD = 77.9). Approximately 74% ($n = 202$) of the events were reported as dates, with the remaining events classified as parties or other social events. Events were most frequently in private settings such as homes (54.4%, $n = 148$); however, 38.2% ($n = 104$) of events occurred in bars or restaurants.

In terms of alcoholic beverages consumed, 47.8% ($n = 130$) of respondents consumed only one type of beverage, 27.2% ($n = 74$) consumed two types of beverages, and 23.9% ($n = 65$) consumed three or more types of beverages. Overall, 61.4% ($n = 167$) of all respondents drank beer at the event, while 26.5% ($n = 72$) consumed wine, 43.4% ($n = 118$) consumed hard liquor, and 46.3% ($n = 126$) consumed mixed drinks.

People at the drinking events accompanying respondents included partners/spouses (52.2%, $n = 142$), roommates (24.6%, $n = 67$), friends from school (44.5%, $n = 121$), friends not from school (67.7%, $n = 182$), and family members (22.8%, $n = 62$). The majority of events occurred in the same county (off campus) in which the university is located (74.6%, $n = 203$), with only 7.7% ($n = 21$) of all events happening on campus. Respondents reported 6.2% ($n = 17$) of all drinking events occurred in Mexico.

Methods of transportation to and from events varied. The most common method of transportation to events was riding in a car (34.2%, $n = 93$), followed by driving a car (29.0%, $n = 79$). Few students walked (9.2%, $n = 25$) or took public transportation (2.9%, $n = 8$) to events.

Similar patterns of transportation were reported for getting home from events. Over 36% ($n = 100$) of the respondents reported riding in a car, 18.0% ($n = 49$) drove a car home, 9.6% ($n = 26$) walked or rode a bike, and 3.3% ($n = 9$) took public transportation home; 10.2% of respondents reported they spent the entire night at the event.

Food was available at 76.8% ($n = 209$) of the events, and nonalcoholic beverages were available at 89.0% ($n = 242$) of events. Illicit drugs were available at 16.1% ($n = 44$) of events. There were 121 (44.5%) respondents who reported that "many people were intoxicated" at the last drinking event. About 9% of the respondents reported smoking marijuana ($n = 24$) at their last drinking event. Alcohol was provided to everyone at 35.6% ($n = 97$) of all events, while 26.4% ($n = 71$) of events were BYOB. Finally, 36 respondents (13.3%) reported playing drinking games at the event.

Table 2 presents bivariate relationships between event characteristics and heavy episodic drinking event status. As shown in the table, most of the relationships are statistically significant based on chi-square analyses. Several of the odds ratios (ORs) suggested high levels of risk or strong levels of protection. Of particular note, smoking marijuana (OR = 24.6), playing drinking games (OR = 13.0), having many people intoxicated (OR = 23.4), and drinking beer (OR =

Table 2. Environmental Characteristics of Drinking Events by Heavy Episodic Drinking Event Status

Characteristic	Heavy Episodic Event				Odds Ratio	95% CI
	Yes	(%)	No	(%)		
Roommates were present[a]	52	(77.6)	15	(22.4)	4.5	2.4–8.6
School friends were present[a]	89	(74.8)	30	(25.2)	5.8	3.4–9.9
Nonschool friends were present[a]	106	(58.6)	75	(41.4)	2.2	1.3–3.8
Family members were present[a]	20	(32.3)	42	(67.7)	.34	0.19–0.67
Respondent drank beer[a]	115	(69.7)	50	(30.3)	7.5	4.3–13.0
Respondent drank wine[a]	19	(26.4)	53	(73.6)	.236	0.13–0.43
Respondent drank liquor[a]	91	(77.8)	26	(22.2)	7.6	4.4–13.2
Respondent drank mixed drinks[a]	86	(68.8)	39	(31.2)	3.8	2.3–6.3
Food was available[a]	86	(41.3)	122	(48.7)	.133	0.064–0.28
Nonalcoholic drinks were available[a]	116	(47.9)	126	(52.1)	.24	0.10–0.61
Bartender served all drinks	50	(54.9)	41	(45.1)	n.s.	n.s.
Many people were intoxicated[a]	104	(86.7)	16	(13.3)	23.4	12.1–45.0
Illegal drugs were available[a]	36	(83.7)	7	(16.3)	6.4	2.7–15.2
Respondent smoked marijuana[a]	22	(95.7)	1	(4.3)	24.6	3.2–185.6
Alcohol was provided to all	44	(45.4)	53	(54.6)	n.s.	n.s.
Event was "BYOB"[a]	54	(77.1)	16	(22.9)	4.5	2.4–8.4
Respondent played drinking games[a]	33	(91.7)	3	(8.3)	13.0	3.8–43.4
Event was in a private setting	74	(50.3)	73	(49.7)	n.s.	n.s.
Event was in a public setting	51	(49.5)	52	(50.5)	n.s.	n.s.
Event was a party or social gathering[a]	36	(75.0)	12	(25.0)	3.7	1.8–7.4
Event was a date[a]	88	(43.8)	113	(56.2)	.32	0.18–0.60
Gender[b]						
Males	73	(59.8)	49	(40.2)	1.3	1.1–1.8
Females	67	(44.6)	83	(55.3)	.75	0.6–0.94
Age[a]						
Respondent <21 years old	99	(67.8)	47	(32.2)	2.1	1.6–2.7
Respondent ≥21 years old	41	(32.8)	84	(67.2)	.48	0.37–0.63

BYOB, bring your own booze; CI, confidence interval.
[a] Chi-square test probability ($p < .001$).
[b] Chi-square test probability ($p < .01$).

7.5) or hard liquor (OR = 7.6) were all major risk factors for the event being a heavy episodic drinking event for the respondent. Almost all of the respondents who reported smoking marijuana or playing drinking games also reported heavy episodic drinking during the same event. As such, these respondents were almost 25 times more likely to report the heavy episodic drinking event than respondents not engaging in these behaviors. In contrast, having family members present (OR = 0.34), drinking wine (OR =0.24), having food (OR =0.13) and nonalcoholic beverages (OR = 0.24) available were all protective factors associated with nonheavy episodic drinking events.

Table 3. Stepwise Logistic Regression Model for Heavy Episodic Drinking Event Status

Variable	Odds Ratio (Probaability)	95% CI
School friends were present at the event	2.4 (.04)	1.0–5.7
Respondent drank beer	6.0 (.0002)	2.3–15.5
Respondent drank hard liquor	11.8 (.0001)	4.6–30.7
Many people were intoxicated	12.8 (.0001)	5.3–30.9
Event was a date	.30 (.02)	0.1–0.83
Thirty-day alcohol use prevalence	1.1 (.03)	1.0–1.2

CI, confidence interval.
Chi- square = 194.6, $df = 6$, $p < .0001$.

Table 3 presents the results of our stepwise multiple logistic regression analysis. Overall, the model is statistically significant ($\chi^2 = 194.6$, $df = 6$, $p < .0001$). Similar to the bivariate analysis, respondents who reported that "many people were intoxicated" at the last drinking event were 12.8 times more likely to report a heavy episodic drinking event then were their counterparts who attended events at which this was not the case. Drinking hard liquor (OR = 11.8) and beer (OR = 6.0) were also risk factors for heavy episodic drinking. The only protective variable remaining in the model was whether the event was a date (OR = 0.30). Only one control variable, 30-day alcohol use prevalence, remained in the model.

DISCUSSION

This study examined environmental characteristics associated with heavy episodic drinking events. The study is unique in that it is one of the few studies examining college students' drinking contexts and environmental characteristics as they relate to heavy episodic drinking. The study is unique in that it examined last drinking event data. Most research on college alcohol use has focused on factors associated with alcohol consumption that occurred any time in the year prior to the survey. Event data, especially when restricted to the last event within the 30 days prior to being surveyed, facilitates respondent recall and allows specific outcomes to be linked to factors that were present prior to the outcome.

Despite these strengths, the present study had a few key limitations. First, data were all based on self-report. Although the validity of self-reports for alcohol-related behaviors has been established (19), it is important to consider that self-report data assumes respondents can report accurately on both their own

drinking behaviors and the characteristics of the event they attended. Ideally, studies such as this would include independent observations of drinking events. Unfortunately, this was not feasible due to logistic factors (i.e., the variety and number of drinking events examined) and fiscal constraints. Although this problem is common to studies examining correlates of drinking behavior (4), it is an important limitation to consider.

Second, the findings presented here are limited to one university located in one unique region of the United States. It is likely that environmental characteristics associated with heavy episodic drinking events vary by region and institution type (e.g., small private schools versus large public schools). Future studies are needed to examine these issues.

Despite these limitations, several of the findings presented above are interesting. Drinking hard liquor and beer both independently contributed to the logistic regression model. Respondents who reported drinking hard liquor at their last drinking event were almost 12 times more likely to report that the event resulted in heavy episodic drinking. Beer drinkers reported a 6-fold increase in the likelihood that the event was a heavy episodic drinking event. These findings lend support for a public health approach to alcohol prevention efforts targeting college students. From a public health approach, the agent (in this case alcohol) is a key factor to consider in prevention strategies. Similarly, environmental approaches to alcohol prevention often advocate for interventions like responsible beverage service and server training (20). These approaches focus on reducing risk associated with the agent (alcohol) through policies that control the price and sales of alcohol. Given that approximately 40% of the events examined in this study occurred in bars or restaurants, such strategies might be viable for college prevention efforts. How such practices could be adapted to private drinking contexts is an issue worthy of further exploration.

The finding that the intoxication of many people at the event contributed to whether the event was a heavy episodic event at an individual level suggests that a "party" atmosphere contributes to alcohol consumption. Again, responsible beverage service strategies might be useful in reducing overall intoxication within regulated public settings. In the private setting, education for party or event hosts on strategies to limit the flow of alcohol might be effective in reducing overall intoxication. Again, further work is required to develop and test such interventions.

Having school friends present at the event also contributed to the final logistic regression model. Respondents that had school friends present were 2.4 times more likely to report that the event was a heavy drinking event. This finding supports the notion that the social influence of peers is important to the etiology of alcohol use. As Hansen (21, p. 157) noted: "According to the social influence model, sub[illegible]ce use and misuse are functions of an individual's interaction with the immedi[illegible] peer group." Hansen goes on to note that perceptions of peer

substance use are the underlying mechanism in the social influence model. Our data do not allow us to differentiate between respondents' perceptions of their peers' substance use and their peers' actual substance use. That is, although the presence of friends at drinking events is associated with increased alcohol consumption, the present study cannot identify the reason for this relationship. Future studies of college students' drinking contexts might benefit from data examining peer influence.

The only protective variable remaining in the multiple logistic regression model was the purpose of the event item, assessing whether the event was a date. Students who reported that their last drinking event was a date were strongly protected against the event being a heavy episodic drinking event. We can only speculate the reason for this finding. It is possible that students who are dating are less likely to use alcohol as a social lubricant. In events in which all the participants are the same gender, it is possible that alcohol consumption is greater. For these data, that possibility is unlikely as only 11.9% of all events were gender specific. Although this low proportion of gender-specific events was not amenable for inclusion in the multivariate model, further consideration of this issue would be interesting. Additional research is needed to determine the underlying mechanism of this protective factor.

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