

ORIGINAL ARTICLE

Taking Up Binge Drinking in College: The Influences of Person, Social Group, and Environment

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Purpose: To identify person, social group, and environmental factors associated with uptake of binge drinking among a national sample of college students.

Methods: Using self-reported responses of students in the 1999 Harvard School of Public Health College Alcohol Study (CAS), we regressed conceptually important predictors of binge drinking onto a dichotomized variable describing uptake in the freshman year. This was a random sample of full-time undergraduates provided by the registrar at each participant school ($n = 119$). For this study, we analyzed data describing a subset of the total sample comprising first year students aged ≤ 19 years, excluding transfers ($n = 1894$). The student CAS is a 20-page voluntary, anonymous mailed questionnaire containing student reports about their alcohol and substance use, school activities, and background characteristics. Analyses included univariate and multivariate logistic regression adjusting for school response rate and using the Generalized Estimating Equations (GEE) in the Statistical Analysis Software package to handle the within-college clustering owing to the sampling scheme.

Results: College students who reported that they were exposed to “wet” environments were more likely to engage in binge drinking than were their peers without similar exposures. Wet environments included social, residential, and market surroundings in which drinking is prevalent and alcohol cheap and easily accessed. Findings held up in multivariate analyses that included variables describing person and social group characteristics. Students who picked up binge drinking in college also were more likely than their peers to report inflated

definitions of binge drinking and more permissive attitudes about appropriate ages for legal consumption.

Conclusions: Binge drinking can either be acquired or avoided in college among students who report they did not binge drink in high school. Reducing college binge uptake may require efforts to limit access/availability, control cheap prices, and maximize substance free environments and associations. © Society for Adolescent Medicine, 2003

KEY WORDS:

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Over the past decade a large body of research has accumulated about alcohol use and abuse among college students [1–7]. The majority of these studies examine alcohol use without considering temporal features in the behavior or investigating developmental transitions and milestones. Further, although existing research about drinking transitions has identified a host of risk and protective factors [8], studies have focused primarily on psychosocial or individual-level ones [9,10]. Uptake of binge drinking in college to date has not been focally explored, nor has the role of environmental factors been systematically examined. Thus, while our understanding has grown about both college drinking and transitions to problem drinking among adolescents, gaps persist about these areas as they pertain both to students entering college and to environmental influences. Because

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adolescents who pick up binge drinking in college (rather than in high school) may be malleable targets for prevention and because environmental factors may be under our control, research in these areas is especially important.

Frequent, heavy, and problem drinking by young adults in college typically focuses on at-risk drinkers identified using quantity/frequency measures, among which "binge drinking" is a standard [2,7,11]. Binge drinking describes consumption of ≥ 5 consecutive drinks per drinking occasion (≥ 4 for women) at least once during the 2 weeks before being surveyed [5]. It is a useful and robust indicator of problem drinking among young adults [12]. Two out of every five young adults in college binge on alcohol [2-4,13]. Approximately one out of every four young adults in college drinks at a binge level frequently, bingeing ≥ 3 times in the 2 weeks before being surveyed (7). Some 33% to 44% of occasional/frequent binge drinkers respectively meet Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV) criteria for past 12-month alcohol abuse and 18% to 74% of occasional/frequent binge drinkers meet DSM-IV criteria for past 12-month alcohol dependence [14]. Binge drinkers experience a host of negative effects, such as school failure and accidents or injury [4,15]. Persons around binge drinkers also report secondhand effects ranging from incivilities to unintentional and intentional injury [16]. The odds of experiencing first- or second-hand negative effects increase with the prevalence of binge drinking at school [6,17,18].

Binge drinking is most prevalent among young men, students who are affiliated with Greek organizations, athletes, younger students, and children who report a family history of problem drinking [6,19,20]. In college, students who binge on alcohol are also at higher risk of using other substances [21]. Frequent binge drinkers commonly report other behavioral risks [6,22] consistent with an overall tendency toward problem behavior [23-25]. At the environmental level risk factors for binge drinking include discount pricing of alcohol in bars and stores, and high densities of alcohol outlets in areas surrounding colleges [6,26]. Environmental factors that protect against bingeing include residing in substance-free dormitories [27] and exposure to community norms that reflect high levels of social capital, or patterns of civic engagement and trust [6,28].

The purpose of this study was to identify individual, social, and environmental factors associated with acquisition of binge drinking among a national sample of older adolescents who recently entered

college from high school. The acquisition of binge drinking upon entering college has not been systematically examined considering individual and environmental factors. It is likely that risk factors for college binge uptake mirror its correlates as well as risks for problem drinking among adolescents, including young age at onset of drinking [8,29] and peers with heavy drinking norms and behaviors [30].

Methods

Using first-year college students' retrospective reports about their drinking in their last year of high school and currently, we compared students who acquired binge drinking in college (referred to as the uptake group) with students who did not (referred to as the non-uptake group). We used descriptive and multivariate statistics to analyze self-report data from the 1999 Harvard School of Public Health College Alcohol Study (CAS). Student-level data were analyzed together with institutional-level data describing characteristics of the CAS colleges (such as type of institution, and NCAA division). The latter were drawn from a survey of administrators at the CAS schools [7].

The CAS was reviewed by the Harvard School of Public Health Human Subjects Committee and given exempt status on the basis that it is voluntary and anonymous.

The Surveys

The student CAS is a 20-page mailed questionnaire containing student reports about their alcohol and substance use, school activities, and background characteristics. The CAS was conducted initially in 1993 at a sample of 140 institutions selected to be nationally representative of 4-year colleges, and follow-up surveys were conducted at these same schools in 1997 and 1999. A random sample of students provided by the school registrar is surveyed at each college.

For the 1999 CAS, questionnaires/reminders were sent to students in three separate mailings between February and April 1999, timed to avoid spring vacation. Participation was voluntary and responses anonymous. To encourage participation, students who returned a separate postcard indicating they completed the questionnaire were entered into a drawing for a \$1000 cash prize. Twelve colleges were unable to provide a timely random sample of students with mailing addresses and were dropped.

Nine colleges failed to meet minimum response rate criteria of 50% in two of the three surveys and at least 40% in the third and were excluded from the analyses. The overall response rate of students at the remaining 119 colleges was 60%. Potential bias owing to non-response was examined using several procedures. No significant differences existed in the binge drinking rates of early and late responders to the survey ($\chi^2_{(1)} = 0.11, p = .74$). Individual college response rates were not associated with the binge drinking rates among the participant schools ($r = .029, p = .753$). School response rate was unrelated to the study outcome when entered into the multivariate models. Further details about the survey methodology and sample characteristics are described elsewhere [4,7].

Measures

The questionnaire defined a "drink" in equivalent amounts of alcohol: a 12-ounce bottle or can of beer; a 4-ounce glass of wine; a 12-ounce bottle or can of wine cooler; or a shot of liquor, either straight or in a mixed drink. We used a gender-specific definition of binge drinking based on analyses equating the risk of alcohol-related health and behavioral problems across gender [5].

Non-binge drinkers consumed alcohol in the past year but did not meet the criteria for binge drinking in the previous 2 weeks. Abstainers had not consumed any alcohol in the past year. High school alcohol use and binge drinking during high school were defined by the amount of alcohol usually consumed during the last year in high school: The specific question asked respondents "During your last year in high school, how many drinks did you usually have when you drank alcohol?" Respondents who reported that they usually consumed "five or more" (for men) or "four or more" (for women) were classified as high school binge drinkers. Our analyses are limited to respondents who were not classified as high school binge drinkers, including those who consumed less than the 5/4 drink criterion and those who abstained from alcohol use. Of these, respondents who reported that they did not typically binge when drinking in high school and did binge in the 2 weeks before being surveyed in college were classified as "uptake drinkers." Respondents who reported that they did not typically binge when drinking in high school and did not binge in the 2 weeks before being surveyed in college were classified as "non-binge drinkers." We compared the uptake group drinkers with non-binge drinkers and abstain-

ers, which together comprised the non-uptake group. To limit recall bias in these retrospective reports we further restricted the study to first-year college students who did not transfer from another school, and those who were aged 19 years or younger.

Data Analysis

Analyses were performed using the SAS statistical package [31]. Logistic regression was used to model the univariate associations among uptake and predictor variables describing sociodemographic characteristics, prior drinking behaviors, social affiliations and influences, alcohol-related norms, perceived accessibility of alcohol, and other risk behaviors. We built a multivariate model using a sequential modeling strategy in which subsets of conceptually linked predictors were entered into logistic models simultaneously and regressed on uptake to identify the most salient independent predictors in each group. Students who did not binge drink in high school and college served as the reference group for these analyses. Variables that failed to reach significance were dropped and collinear variables composited. Remaining variables were entered into a larger multivariate model. We adjusted the analysis for the response rate of each school as a college level covariate to control potential confounding with other student and school characteristics. We used the Generalized Estimating Equations (GEE) method [32,33] to fit the multivariate logistic regression models and appropriately handle the within-college clustering owing to the sampling scheme. Univariate analyses were identical whether or not we used GEE and are reported in their non-GEE format. We report final results for a multivariate model that includes college abstainers in the reference group using GEE. Excluding abstainers in college from the reference group produced similar results (data available on request).

Results

Sample Characteristics of Uptake and Non-uptake Groups

The survey sample included 1894 college students, all of whom were in their first year of college and aged ≤ 19 years. Approximately one-third of the sample was male. Of the total sample, 36% ($n = 683$) reported that they abstained from alcohol in the past year and another 38% ($n = 717$) reported they drank

but did not binge. These groups comprise the non-uptake group, which serves as the reference for all analyses. The remaining 26% ($n = 494$) comprise the uptake group, of which 66% ($n = 328$) reported that they binged occasionally in the past two weeks (i.e., 1–2 times) and 34% ($n = 166$) did so frequently (i.e., ≥ 3 times).

Drinking Behaviors Among Uptake and Non-uptake Groups

Among students who drank any alcohol, more uptake than non-uptake students drank frequently in the month before being surveyed (68% vs. 32% drank ≥ 3 times in the past 30 days). When they drank, students in the uptake group were more likely than those in the non-uptake group to do so at close to a binge level: 65% of the former consumed ≥ 3 drinks per sitting in the 30 days before being interviewed, compared with 31% of the latter. The majority (65%) of the uptake group reported they had been drunk at least three times in the 30 days before being surveyed, whereas the majority of the non-uptake group (66%) reported they had never been drunk during that period.

Correlates of Uptake

Sociodemographic factors. Although there were more females than males in the study sample, the proportion of students who acquired binge drinking was the same for both genders. White students were more likely than non-white students to pick up binge drinking in college, whereas Asian and African-American students were less likely than their non-Asian or non-African-American peers, respectively, to do so (Table 1).

Precollege and family drinking patterns. Early onset of recreational drinking and getting drunk distinguished uptake from non-uptake groups. Students who began recreationally drinking and/or who reported being drunk before age 16 years were more likely to pick up binge drinking in college than were their peers who reported drinking and getting drunk later in adolescence. Similarly, students who began binge drinking in college were more likely than those who did not to report any alcohol consumption during a typical month in their last year of high school. Parents' alcohol use and attitudes toward use also differentiated between uptake and non-uptake groups. Approximately two-thirds of the uptake

group and one-half of the non-uptake group reported that their parents drank while they were growing up. Similarly, about one-third of the uptake group, but two-fifths of the non-uptake group reported their parents disapproved of drinking while they were growing up.

Residential characteristics and affiliations of uptake and non-uptake groups. Students in the uptake group were more likely to report living in coeducational campus housing than were students in the non-uptake group. Conversely, students who acquired binge drinking in college were less likely than their peers to report living off-campus with a parent or in substance-free housing. Proportionately more students in the uptake group reported being affiliated with Greek letter organizations. Conversely, the uptake group students were less likely than their peers to report that religion was important to them. Finally, students in the uptake group were more likely than those in the non-uptake group to report being social, as measured by variables such as having five or more close friends or spending time socializing.

Normative perceptions about binge drinking and drinking-related policies. Students who acquired binge drinking in college were more likely than those who did not to report inflated definitions of binge drinking. A majority of those who acquired binge drinking in college defined binge drinking as "consuming eight or more drinks" for men and "six or more drinks for women". By contrast, about one-third of the non-uptake group defined binge drinking among males as consumption of "eight or more drinks" and about the same percentage defined it among females as consuming "six or more drinks." There was also a divergence in the percentages of non-uptake and uptake groups who reported thinking that the legal drinking age should be ≤ 18 years.

Students who started binge drinking in college were more likely to report that "because everyone else does" and "fitting in with others" were important reasons for drinking compared with their non-uptake group peers. No differences existed between the two groups in the perception of binge drinking at their school. However, significant differences existed for the same two groups when they were asked to report on the percentage of their friends who binged on alcohol. Proportionately more students in the uptake than non-uptake group reported that a majority of their close friends binge.

Table 1. Logistic Regression Results for Unadjusted Correlates of Uptake

	No Binge HS/College n = 1400	Uptake Binge Drinking in College n = 494	Pairwise Comparison ^a	
			Crude OR	(95% CI)
Sociodemographic factors				
Gender				
Male	35	37	1.00	(0.89, 1.37)
Female	65	63		
Race/ethnicity				
White	67	80	1.96	(1.53, 2.52)
African-American	9	3	0.31	(0.18, 0.54)
Asian	14	7	0.43	(0.29, 0.64)
Hispanic	8	7	0.93	(0.63, 1.39)
Native American	8	8	1.02	(0.70, 1.48)
White Hispanic	1	1	1.00	(0.39, 2.54)
Pre-college and family drinking patterns				
Parents and alcohol				
Parent drink alcohol	53	66	1.77	(1.43, 2.19)
Parents disapproved of drinking alcohol while growing up	43	35	0.70	(0.56, 0.86)
Age of onset of recreational drinking (yrs)				
≤12	3	2		
13–15	8	19	2.03	(1.54, 2.67)
≥16	41	77		
Never	48	3		
Age of onset of getting drunk (yrs)				
≤12	2	1		
13–15	5	15	2.65	(1.93, 3.65)
≥16	31	79		
Never	62	5		
HS frequency drank, typical month				
None	71	38		
1–2	23	42	3.99	(3.22, 4.95)
≥3	7	20		
HS usual quantity drank				
None	67	33		
1–2	23	27	4.07	(3.27, 5.06)
3–4	10	40		
Residential characteristics & affiliations				
Place of residence				
Single sex dorm	29	25	0.83	(0.65, 1.04)
Coed dorm	41	57	1.90	(1.55, 2.34)
Greek housing	1	1	2.85	(0.99, 8.16)
Off campus w/roommate	4	3	0.82	(0.47, 1.44)
Off-campus w/parents	17	7	0.40	(0.28, 0.57)
Off-campus alone	1	1	1.53	(0.61, 3.87)
Substance-free dorm	25	20	0.73	(0.57, 0.94)
Affiliation				
Greek members	6	15	2.62	(1.88, 3.65)
Athlete	18	19	1.07	(0.82, 1.39)
Religion is important	54	40	0.56	(0.45, 0.69)
Never married	100	100	2.48	(0.31, 20.23)
Social Environment & Activities				
Has 5+ close friends	51	61	1.48	(1.20, 1.82)
Spends 3+ h a day socializing	53	64	1.57	(1.27, 1.94)
Has 5 or more friends and drinks either to “fit in” or “because everyone else is doing it”	6	21	4.51	(3.29, 6.19)

Continued

Table 1. Continued

	No Binge HS/College <i>n</i> = 1400	Uptake Binge Drinking in College <i>n</i> = 494	Pairwise Comparison ^a	
			Crude OR	(95% CI)
Lives in a "wet" environment (attends high binge school [not sub-free dorm], or lives in Greek housing)	24	42	2.32	(1.87, 2.88)
Normative perceptions about binge drinking and drinking-related policies				
Number of consecutive drinks required to be called a college male binge drinker				
3 or less	6	1		
4	12	4		
5	21	12		
6-7	31	26	3.13	(2.41, 4.06)
8 or more	30	57		
How many consecutive drinks required to be called a college female binge drinker				
3 or less	15	4		
4	27	18	2.52	(1.98, 3.21)
5 or more	59	79		
% All students perceived to binge at school				
< 30	36	35	0.98	(0.79, 1.21)
≥ 50	27	32	1.31	(1.05, 1.64)
≥ 70	9	11	1.33	(0.95, 1.86)
% Friends perceive to binge at school				
< 30	77	61	0.46	(0.37, 0.58)
≥ 50	11	27	3.15	(2.43, 4.09)
≥ 70	5	14	3.08	(2.17, 4.37)
Opinion: legal drinking age				
≤ 18	34	54	2.28	(1.85, 2.81)
21	52	19	0.23	(0.18, 0.29)
Reasons to drink alcohol				
Everyone else is doing it	15	44	4.27	(3.39, 5.37)
To fit in with friends	11	25	2.63	(2.03, 3.42)
Education about alcohol risks				
Alcohol education				
Attended lectures, meetings, workshops	30	38	1.42	(1.15, 1.76)
Taken special course on alcohol	10	10	1.00	(0.71, 1.40)
Alcohol counseling				
Sought help in college	0	0	1.14	(0.22, 5.88)
Received counseling in college	0	1	4.30	(1.21, 15.30)
Access to pricing of alcohol				
How easy to get alcohol?				
Very easy	26	42	2.07	(1.66, 2.59)
Locations to obtain alcohol w/o ID				
Off-campus bar	28	39	1.67	(1.34, 2.07)
Liquor store	25	35	1.67	(1.35, 2.10)
Greek house	56	73	2.06	(1.64, 2.58)
How much usually pay for a drink?				
Set fee	2	13		
≤ \$1	4	18	7.22	(5.37, 9.71)
> \$1	13	38		
Usually free	26	31		

Continued

Table 1. Continued

	No Binge HS/College <i>n</i> = 1400	Uptake Binge Drinking in College <i>n</i> = 494	Pairwise Comparison ^a	
			Crude OR	(95% CI)
College-level characteristics				
Type of institution				
Traditionally Black colleges	0.8	0.4	0.51	(0.11, 2.32)
Women's colleges	7	3	0.41	(0.23, 0.72)
Public colleges	67	69	1.09	(0.88, 1.36)
Commuter colleges	11	6	0.51	(0.34, 0.77)
NCAA division				
Division 1	56	61	1.25	(1.01, 1.54)
Division 2	19	19		
Division 3	14	13		
Nonmember	12	7		
Competitiveness (Barron's rating)				
Least competitive	19	15		
Competitive	33	29		
Very Competitive	26	32	1.36	(1.10, 1.67)
Most Competitive	21	23		

^a Reference group is nonbinge drinkers in high school and college.
HS = high school.

Education about alcohol risks. Exposure to educational programming about the risks related to alcohol consumption did not differentiate between students in the uptake and non-uptake groups. Similarly, no differences were found between the groups among those who had taken a special course on alcohol. However, students who reported picking up binge drinking were more likely than their peers to report they had attended lectures, meetings, or workshops on alcohol.

Access and pricing of alcohol. Self-reported access to alcohol was associated with increased odds of picking up binge drinking in college. Students in the uptake group were more likely than those in the non-uptake group to report that alcohol was "very easy" to obtain. Cheap or discounted alcohol was also related to the uptake of binge drinking. Students who reported paying one dollar or less for a drink were considerably more likely to begin binge drinking than were students who reported paying more than a dollar per drink.

College-level characteristics of the sample. Students in the uptake group attended commuter schools, women-only colleges, and schools with a Protestant religious affiliation less often than did their non-uptake group peers. Students in the uptake group more often attended schools whose athletic departments were members of NCAA Division 1 and schools that were designated as very competitive or higher by

Barron's [34] than their non-uptake peers. There were no significant differences between the two groups for region of the country, enrollment size, and public/private funding source.

Multivariate Analysis

Our final regression model included predictors from the series of conceptually linked predictors reflecting a range of influences on uptake, from individual sociodemographic characteristics and past drinking history to reports about access and low costs of alcohol (Table 2).

Young adult males, those who described themselves as white and members of Greek letter organizations, were at elevated risk of picking up binge drinking. High school monthly drinkers had over three times the odds of acquiring binge drinking in college than did high school non-monthly drinkers.

Students who reported holding "wet" attitudes, measured as a combination of inflated thresholds for defining binge drinking and a belief that the legal drinking age should be lower than age 21 years, demonstrated significantly greater risk of picking up binge drinking than did students who did not report those attitudes. Students who believed that more than half of their friends binge drink were at elevated risk of uptake compared with students who believed fewer of their friends did. Moreover, students who reported many friends and sensitivities to peer pressures to drink were more likely to binge drink in

Table 2. Final Regression Model (Generalized Estimating Equation [GEE])

	Model (<i>n</i> = 1565)	
	mv-OR ^a	(95% CI)
Gender (male)	1.20	(0.91, 1.58)
Race (white)	1.63	(1.20, 2.24)
Lives off-campus with parents	0.58	(0.33, 0.99)
Member of a Greek organization	1.94	(1.18, 3.14)
Typically drank alcohol ≥ 1 month last year in HS	3.28	(2.52, 4.13)
Wet attitudes (defines binge drinking as 6/5 or higher and believes the legal drinking age should be lower than 21)	2.89	(2.19, 3.83)
Believes that more than half of friends binge drink	2.77	(1.89, 3.97)
Has 5 or more friends and drinks either to "fit in" or "because everyone else is doing it"	2.36	(1.53, 3.68)
Access to alcohol is "very easy" and has obtained alcohol from someone 21 or older or can get alcohol without an ID at a bar, liquor store, or Greek party	1.76	(1.27, 2.41)
Usually pays \$1 or less or a set fee for an alcoholic drink	4.38	(2.95, 6.56)
Attends a high binge school and does not live in a substance-free dorm or lives in a Greek organization house	1.53	(1.15, 2.03)
School response rate	1.01	(1.00, 1.03)

^a Reference group is nonbinge drinkers in high school and college.

HS = high school.

college than were their peers with fewer friends and lesser perceived peer influences.

Paying a very low (i.e., \$1 or less/drink) or set fee for alcohol was associated with binge drinking. Students who reported that it is very easy to access alcohol and that they have procured alcohol from either a peer of legal drinking age or from a bar, liquor store, or Greek party without identification of age were more likely to binge drink than were their peers who found it harder to procure and/or were without network or purchase sources.

Finally, students were more likely to begin binge drinking in college if they lived in a "wet" setting, specifically in a non-substance-free dormitory in a college where more than 50% of students binge or in a Greek-affiliated house at a lower prevalence (i.e., < 50%) school.

Discussion

Young people who reported that they came from, socialized within, or were exposed to, "wet" envi-

ronments were more likely to pick up binge drinking in college than were their peers without similar exposures. Wet environments included friendship networks and affiliations within which binge drinking is common and endorsed, social, residential, and market surroundings in which drinking is prevalent and alcohol easy to access and cheap. Young people who picked up binge drinking in college were more likely than their peers who did not to report inflated definitions of binge drinking and to favor younger ages for legal consumption. Even a very low level of high school drinking placed students at risk of college binge uptake. Students who reported they drank at least once a month during their final year in high school were over three times more likely to pick up binge drinking in college than were students who drank less frequently.

Differences between the uptake and non-uptake groups were strong despite our including in the reference group some students who reported frequent or heavy drinking, or who may have binged on alcohol, but not in the past 2 weeks. The implication of including these drinkers in the reference group is that our findings may actually underestimate the true effect sizes, making them conservative estimates.

Students who picked up binge drinking were distinguished from those who did not by their reports about alcohol's "very easy" accessibility/availability through peers and/or outlets, and its cheap price. These differences persisted after adjusting for gender, Greek organization affiliation, and residence, all primary risk factors [6]. Parental alcohol use and attitudes toward their child's drinking were significantly related to the odds of college binge uptake in univariate analyses, as were variables describing early onset of drinking and getting drunk. These findings washed out in multivariate analyses and it is likely that family and onset factors best describe risks for high school drinking, which in turn predict college patterns.

Analyses suggest the importance of a comprehensive prevention approach to prevent the acquisition of binge drinking in college. This type of approach is rare [35]. Evidence suggests that pre-college interventions should focus on delaying drinking onset and discouraging high school consumption, whereas college interventions should balance educational and normative prevention with more environmentally oriented approaches, including efforts to maximize substance-free housing while minimizing easily accessed low cost alcohol. The latter may be achieved

by working with communities to control volume discounts and low-cost pricing, and to ensure that outlets in college towns are serving appropriately. A balanced approach is suggested both by the strength of the variables reflecting environmental factors and by findings that exposure to alcohol educational programming did not distinguish uptake from non-uptake groups. Indeed, we found that students at highest risk of misusing alcohol report extremely high levels of exposure to alcohol programming. It is likely that these groups are being correctly targeted for intervention (e.g., colleges may require/mandate education for students identified as being affiliated with high-risk groups, such as Greek organizations, or as having conduct programs related to alcohol), but educational interventions are insufficient to change their behaviors. The potential significance to prevention of access, price-, and place-related variables may be great. Unlike variables describing family history and/or peers, they are under the control of schools and communities [36].

In considering these findings we note several limitations. First, we relied on cross-sectional data that may reliably describe patterns of association but not causality. To limit the possibility that reporting biases related to elapsed time and recall would affect our results we restricted the study population to first-year non-transfer students who were aged ≤ 19 years. Also, the cross-sectional nature of these data allow for the possibility that factors related to student self-selection into "wetter" or "drier" environments may contribute to our findings. Second, we relied on self- as opposed to objective-reports of patterns of alcohol use and other health risk behaviors. Self-report surveys are common in studies examining alcohol use and are generally considered reliable [37–39]. The binge drinking and other substance use rates reported by respondents to the CAS are similar to those found in other major national surveys [2,3,13], increasing our confidence in the work. A short form of the questionnaire sent to non-responders did not reveal any differences in alcohol use between them and students who responded to the longer questionnaire. In addition, school response rates were not associated with rates of binge drinking [7]. Third, we relied on individual self-reports about alcohol-related access and pricing variables that are presumed to reflect aspects of the environment. Finally, our results pertain to college students in college settings and may not be more widely generalizable.

Conclusions

Binge drinking can either be acquired or avoided in college among students who report that they did not binge drink in high school. Reducing binge drinking may require efforts to limit access/availability, control cheap prices, and maximize substance-free environments and associations.

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