

# Appendix A: Sample Journal Article

## ***Health and Behavioral Consequences of Binge Drinking in College***

### ***A National Survey of Students at 140 Campuses***

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**Objective.**—To examine the extent of binge drinking by college students and the ensuing health and behavioral problems that binge drinkers create for themselves and others on their campus.

**Design.**—Self-administered survey mailed to a national representative sample of US 4-year college students.

**Setting.**—One hundred forty US 4-year colleges in 1993.

**Participants.**—A total of 17,592 college students.

**Main Outcome Measures.**—Self-reports of drinking behavior, alcohol-related health problems, and other problems.

**Results.**—Almost half (44%) of college students responding to the survey were binge drinkers, including almost one fifth (19%) of the students who were frequent binge drinkers. Frequent binge drinkers are more likely to experience serious health and other consequences of their drinking behavior than other students. Almost half (47%) of the frequent binge drinkers experienced five or more different drinking-related problems, including injuries and engaging in unplanned sex, since the beginning of the school year. Most binge drinkers do not consider themselves to be problem drinkers and have not sought treatment for an alcohol problem. Binge drinkers create problems for classmates who are not binge drinkers. Students who are not binge drinkers at schools with higher binge rates were more likely than students at schools with lower binge rates to experience problems such as being pushed, hit, or assaulted or experiencing an unwanted sexual advance.

**Conclusions.**—Binge drinking is widespread on college campuses. Programs aimed at reducing this problem should focus on frequent binge drinkers, refer them

to treatment or educational programs, and emphasize the harm they cause for students who are not binge drinkers.

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Heavy episodic or binge drinking poses a danger of serious health and other consequences for alcohol abusers and for others in the immediate environment. Alcohol contributes to the leading causes of accidental death in the United States, such as motor vehicle crashes and falls.<sup>1</sup> Alcohol abuse is seen as contributing to almost half of motor vehicle fatalities, the most important cause of death among young Americans.<sup>2</sup> Unsafe sex—a growing threat with the spread of acquired immunodeficiency syndrome (AIDS) and other sexually transmitted diseases—and unintentional injuries have been associated with alcohol intoxication.<sup>3-5</sup> These findings support the view of college presidents who believe that alcohol abuse is the No. 1 problem on campus.<sup>6</sup>

Despite the fact that alcohol is illegal for most undergraduates, alcohol continues to be widely used on most college campuses today. Since the national study by Straus and Bacon in 1949,<sup>7</sup> numerous subsequent surveys have documented the overwhelming use of alcohol by college students and have pointed to problem drinking among this group.<sup>8-10</sup> Most previous studies of drinking by college students have been conducted on single college campuses and have not used random sampling of students.<sup>9-12</sup> While these studies are in general agreement about the prevalence and consequences of binge drinking, they do not provide a national representative sample of college drinking.

A few large-scale, multicollge surveys have been conducted in recent years. However, these have not selected a representative national sample of colleges, but have used colleges in one state<sup>3</sup> or those participating in a federal program,<sup>5</sup> or have followed a sample of high school seniors through college.<sup>13</sup>

In general, studies of college alcohol use have consistently found higher rates of binge drinking among men than women. However, these studies used the same definition of binge drinking for men and women, without taking into account sex differences in metabolism of ethanol or in body mass.<sup>3,5,9-12,14-17</sup>

The consequences of binge drinking often pose serious risks for drinkers and for others in the college environment. Binge drinking has been associated with unplanned and unsafe sexual activity, physical and sexual assault, unintentional injuries, other criminal violations, interpersonal problems, physical or cognitive impairment, and poor academic performance.<sup>3-5</sup>

This study examines the nature and extent of binge drinking among a representative national sample of students at 140 US 4-year colleges and details the problems such drinking causes for drinkers themselves and for others on their college campus. Binge drinking is defined through a sex-specific measure to take into account sex differences in the dosage effects of ethanol.

## Methods

### The Colleges

A national sample of 179 colleges was selected from the American Council on Education's list of 4-year colleges and universities accredited by one of the six regional bodies covering the United States. The sample was selected using

probability proportionate to enrollment size sampling. All full-time undergraduate students at a university were eligible to be chosen for this study, regardless of the college in which they were enrolled. This sample contained few women-only colleges and few colleges with less than 1000 students. To correct for this problem, an oversample of 15 additional colleges with enrollments of less than 1000 students and 10 all-women's colleges were added to the sample. Nine colleges were subsequently dropped because they were considered inappropriate. These included seminary schools, military schools, and allied health schools.

One hundred forty (72%) of the final sample of 195 colleges agreed to participate. The primary reason stated for nonparticipation by college administrators was inability to provide a random sample of students and their addresses within the time requirements of the study. The 140 participating colleges are located in 40 states and the District of Columbia. They represent a cross-section of US higher education. Two thirds of the colleges sampled are public and one third are private. Approximately two thirds are located in a suburban or urban setting and one third in a small town/rural setting. Four percent are women-only, and 4% are predominantly black institutions.

When the 55 nonparticipating schools were compared with the 140 in the study, the only statistically significant difference found was in terms of enrollment size. Proportionately fewer small colleges (fewer than 1000 students) participated in the study. Since these were oversampled, sufficient numbers are present for statistical analysis.

## Sampling Procedures

Colleges were sent a set of specific guidelines for drawing a random sample of students based on the total enrollment of full-time undergraduates. Depending on enrollment size, every  $x$ th student was selected from the student registry using a random starting point. A sample of undergraduate students was provided by each of the 140 participating colleges: 215 students at each of 127 colleges, and 108 at each of 13 colleges (12 of which were in the oversample). The final student sample included 28,709 students.

## The Questionnaire

The 20-page survey instrument asked students a number of questions about their drinking behavior as well as other health issues. Whenever possible, the survey instrument included questions that had been used previously in other national or large-scale epidemiological studies.<sup>13,14</sup> A drink was defined as a 12-oz (360-mL) can (or bottle) of beer, a 4-oz (120-mL) glass of wine, a 12-oz (360-mL) bottle (or can) of wine cooler, or a shot (1.25 oz [37mL]) of liquor straight or in a mixed drink. The following four questions were used to assess binge drinking: (1) sex; (2) recency of last drink ("never," "not in past year," "within last year but more than 30 days ago," "within 30 days but more than 1 week ago," or "within week"); (3) "Think back over the last two weeks. How many times have you had five or more drinks in a row?" (The use of this question, without specification of time elapsed in a drinking episode, is consistent with standard practice in recent research on alcohol use among this population.<sup>3,5,13,18</sup>); and (4) "During the last two weeks, how many times have you had four drinks in a row (but no more than that) (for women)?" Missing responses to any of these four questions excluded the student from the bingeing analyses.

Students were also asked the extent to which they had experienced any of the following 12 problems as a consequence of their drinking since the beginning of the school year: have a hang-over; miss a class; get behind in school-work; do something you later regretted; forget where you were or what you did; argue with friends; engage in unplanned sexual activity; not use protection when you had sex; damage property; get into trouble with campus or local police; get hurt or injured; or require medical treatment for an alcohol overdose. They were also asked if, since the beginning of the school year, they had experienced any of the following eight problems caused by other students' drinking: been insulted or humiliated; had a serious argument or quarrel; been pushed, hit, or assaulted; had your property damaged; had to "babysit" or take care of another student who drank too much; had your studying or sleep interrupted; experienced an unwanted sexual advance; or had been a victim of sexual assault or date rape.

### **The Mailing**

The initial mailing of questionnaires to students began on February 5, 1993. By the end of March, 87% of the final group of questionnaires had been received, with another 10% in April and 2% in May and June. There are no discernible differences in binge rates among questionnaires received in each of the 5 months of the survey. Mailings were modified to take into account spring break, so that students would be responding about their binge drinking behavior during a 2-week time on campus. Responses were voluntary and anonymous. Four separate mailings, usually 10 days apart, were sent at each college: a questionnaire, a reminder postcard, a second questionnaire, and a second reminder postcard. To encourage students to respond, the following cash awards were offered: one \$1000 award to a student whose name was drawn from among students responding within 1 week, and one \$500 award and ten \$100 awards to students selected from all those who responded.

### **The Response Rate**

The questionnaires were mailed to 28,709 students. Overall, 3082 students were eliminated from the sample because of school reports of incorrect addresses, withdrawal from school, or leaves of absence, reducing the sample size to 25,627. A total of 17,592 students returned questionnaires, yielding an overall student response rate of approximately 69%. The response rate is likely to be underestimated since it does not take into account all of the students who may not have received questionnaires. At 104 of the colleges, response rates were between 60% and 80%, and only six colleges had response rates less than 50%. Response rate was not associated with the binge rate (ie, the Pearson correlation coefficient between the binge drinking rate at the college and the response rate was 0.06 with a *P* value of .46).

When responses of early and late responders to the survey were compared, there were no significant differences in the percent of nondrinkers, nonbinge drinkers, and binge drinkers. In the case of 11,557 students who could be classified as early or late responders, there was no significant difference in terms of binge drinking (43% for the early responders vs 42% for the late responders). An additional short form of the questionnaire was mailed to a segment of students who had failed to return the questionnaire. The rate of binge drinking of these non-responders did not differ from that of responders to the original student survey.

## Data Analysis

All statistical analyses were carried out using the current version of SAS.<sup>19</sup> Comparisons of unweighted and weighted sample results suggested little difference between them, so unweighted results are reported here. Chi-square analyses among students who had a drink in the past year were used to compare nonbinge drinkers, infrequent binge drinkers, and binge drinkers. Binge drinking was defined as the consumption of five or more drinks in a row for men and four or more drinks in a row for women during the 2 weeks prior to the survey. An extensive analysis showed that this sex-specific measure accurately indicates an equivalent likelihood of alcohol-related problems. In this article, the term “binge drinker” is used to refer to students who binged at least once in the previous 2 weeks. Frequent binge drinkers were defined as those who binged three or more times in the past 2 weeks and infrequent binge drinkers as those who binged one or two times in the past 2 weeks. Nonbinge drinkers were those who had consumed alcohol in the past year, but had not binged.

Logistic regression analyses were used to examine how much more likely frequent binge drinkers were to experience an alcohol-related problem or driving behavior compared with nonbinge drinkers, and to compare infrequent binge drinkers with nonbinge drinkers. Odds ratios were adjusted for age, sex, race, marital status, and parents’ college education.

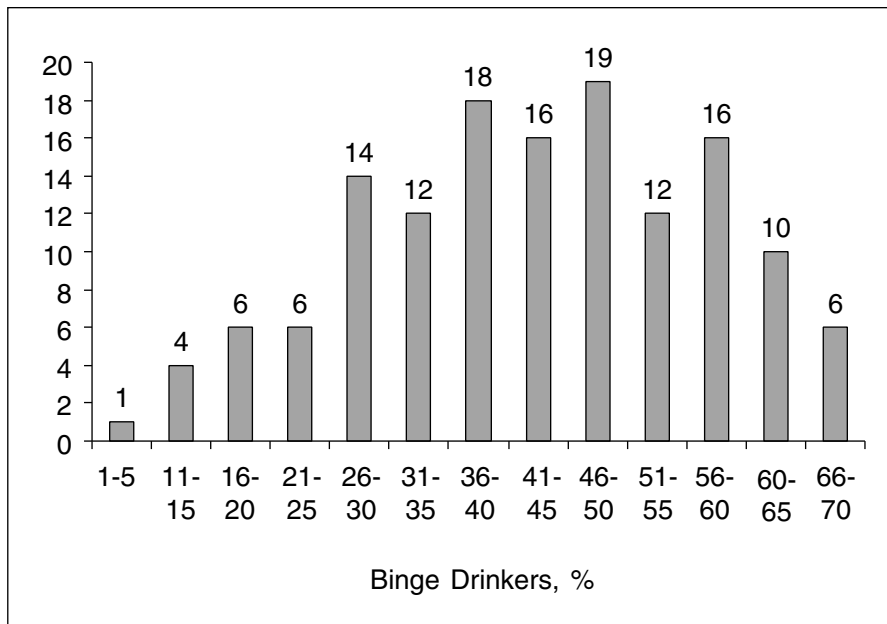
In examining secondary binge effects, schools were divided into three groups on the basis of the percentage of students who were binge drinkers at each school. The responses of students who had not binged in the past 2 weeks (including those who had never had a drink) and who resided in dormitories, fraternities, or sororities were compared through  $\chi^2$  analyses across the three school types. High-level binge schools (where 51% or more students were binge drinkers) included 44 schools with 6084 students; middle-level binge schools (36% to 50% of students were binge drinkers) included 53 schools with 6455 students; and low-level binge schools (35% or less of students were binge drinkers) included 43 schools with 5043 students (for 10 students, information regarding school of attendance was missing). For two of the problems that occurred primarily or almost exclusively to women (sexual assault and experiencing an unwanted sexual advance), only women were included in the analyses.

## Results

### Characteristics of the Student Sample

This analysis is based on data from 17,592 undergraduate students at 140 US 4-year colleges. The student sample includes more women (58%) than men (42%), due in part to the inclusion of six all-women’s institutions. This compares with national 1991 data that report 51% of undergraduates at 4-year institutions are women.<sup>20</sup> The sample is predominantly white (81%). This coincides exactly with national 1991 data that report 81% of undergraduates at 4-year institutions are white.<sup>20</sup> Minority groups included Asian/Pacific Islander (7%), Spanish/Hispanic (7%), black/African American (6%), and Native American (1%). The age of the students was distributed as follows: 45% younger than 21 years, 38% aged 21 to 23 years, and 17% aged 24 years or more. There were slightly more juniors (25%) and seniors (26%) in the sample than freshmen (20%) and sophomores (19%), probably because 30% of the students were transfers from other institutions.

Distribution of Colleges by Percentage of Binge Drinkers [Figure 1]



Ten percent of the students were in their fifth undergraduate year of school or beyond. Religious affiliation was discerned by asking students in which of the following religions they were raised: Protestant (44%), Catholic (36%), Jewish (3%), Muslim (1%), other (4%), and none (12%). Religion was cited as an important to very important activity among 36% of the students. Approximately three of five students (59%) worked for pay. Approximately half (49%) of the students had a grade-point average of A, A-, or B+.

### Extent of Binge Drinking

Because of missing responses, there were 496 students excluded from binge analyses (ie, 17,096 were included). Most students drank alcohol during the past year. Only about one of six (16%) were nondrinkers (15% of the men and 16% of the women). About two of five students (41%) drank but were nonbinge drinkers (35% of the men and 45% of the women). Slightly fewer than half (44%) of the students were binge drinkers (50% of the men and 39% of the women). About half of this group of binge drinkers, or about one in five students (19%) overall, were frequent binge drinkers (overall, 23% of the men and 17% of the women).

### Binge Drinking Rates at Colleges

Figure [1] shows that binge drinking rates vary extensively among the 140 colleges in the study. While 1% of the students were binge drinkers at the school with the lowest rate of binge drinkers, 70% of students were binge drinkers at the school with the highest rate. At 44 schools, more than half of the responding students were binge drinkers.

When the 140 colleges were divided into levels of binge rate,  $\chi^2$  analyses showed that several college characteristics were individually associated

**Table 1** Drinking Styles of Students Who Were Nonbinge Drinkers, Infrequent Binge Drinkers, or Frequent Binge Drinkers\*

Drinking Styles	Nonbinge Drinkers, %†		Infrequent Binge Drinkers, %‡		Frequent Binge Drinkers, %§	
	Men (n = 2539)	Women (n = 4400)	Men (n = 1968)	Women (n = 2130)	Men (n = 1630)	Women (n = 1684)
Drank on 10 or more occasions in the past 30 d	3	1	11	6	61	39
Usually binges when drinks	4	4	43	45	83	82
Was drunk three or more times in the past month	2	1	17	13	70	55
Drinks to get drunk¶	22	18	49	44	73	68

\* Chi-square comparisons of students who were nonbinge drinkers, infrequent binge drinkers, and frequent binge drinkers and each of the four drinking styles were significant for men and women separately at  $P < .001$ . Sample sizes vary slightly for each question because of missing values. Binging is defined as four or more drinks for women and five or more drinks for men.

† Students who consumed alcohol in the past year, but did not binge.

‡ Students who binged one or two times in a 2-week period.

§ Students who binged three or more times in a 2-week period.

|| Question asked, "On how many occasions have you had a drink of alcohol in the past 30 days?" Response categories were 1 to 2 occasions, 3 to 5 occasions, 6 to 9 occasions, 10 to 19 occasions, 20 to 39 occasions, and 40 or more occasions.

¶ Says that to get drunk is an important reason for drinking.

(at  $P < .05$ ) with bingeing rate. Colleges located in the Northeast or North Central regions of the United States (compared with those in the West or South) or those that were residential (compared with commuter schools, where 90% or more of the students lived off campus)<sup>21</sup> tended to have higher rates of bingeing. In addition, traditionally black institutions and women's colleges had lower binge rates than schools that were not traditionally black or were coeducational colleges. Other characteristics, such as whether the college was public or private and its enrollment size, were not related to binge drinker rates.

Examination of whether college alcohol programs and policies have any association with binge drinking will be presented in a separate publication. There is little evidence to conclude that current policies have had strong impacts on overall drinking levels. Preliminary analyses suggest that individual binge drinking is less likely if the institution does not have any alcohol outlets within 1 mile of campus, or if it prohibits alcohol use for all persons (even those older than 21 years) on campus.

### Drinking Patterns of Binge Drinkers

Table 1 indicates that our designations of binge drinker and frequent binge drinker are strongly indicative of a drinking style that involves more frequent and heavier drinking. Furthermore, intoxication (often intentional) is associated with binge drinking in men and women.

Binge drinking is related to age. Students who are in the predominant college age group (between 17 and 23 years) have much higher binge rates than older students. However, within the predominant college age group, students who are younger than the legal drinking age of 21 years do not differ in binge rates from students aged 21 to 23 years. In contrast to the modest effects of age, there is no relationship between year in school and bingeing, with rates of binge drinking virtually identical among students across the years of college attendance.

### **Alcohol-Related Health and Other Problems**

There is a strong, positive relationship between the frequency of binge drinking and alcohol-related health and other problems reported by the students (Table 2). Among the more serious alcohol-related problems, the frequent binge drinkers were seven to 10 times more likely than the nonbinge drinkers to not use protection when having sex, to engage in unplanned sexual activity, to get into trouble with campus police, to damage property, or to get hurt or injured. A similar comparison between the infrequent binge drinkers and nonbinge drinkers also shows a strong relationship.

Men and women reported similar frequencies for most of the problems, except for damaging property or getting into trouble with the campus police. Among the frequent binge drinkers, 35% of the men and 9% of the women reported damaging property, and 16% of the men and 6% of the women reported getting into trouble with the campus police.

### **Drinking and Driving**

There is also a positive relationship between binge drinking and driving under the influence of alcohol (Table 3). A large proportion of the student population reported driving after drinking alcohol. Binge drinkers, particularly frequent binge drinkers, reported significantly ( $P < .001$ ) higher frequencies of dangerous driving behaviors than non-binge drinkers.

### **Number of Problems**

Nearly half (47%) of the frequent binge drinkers reported having experienced five or more of the 12 problems listed in Table 2 (omitting hangover and including driving after drinking) since the beginning of the school year, compared with 14% of infrequent binge drinkers and 3% of nonbinge drinkers. The adjusted odds ratios indicate that frequent binge drinkers were 25 times more likely than nonbinge drinkers to experience five or more of these problems, while the infrequent binge drinkers were five times more likely than nonbinge drinkers to experience five or more problems.

### **Self-Assessment of Drinking Problem**

Few students describe themselves as having a drinking problem. When asked to classify themselves in terms of their current alcohol use, less than 1% of the total sample (0.2%), including only 0.6% of the frequent binge drinkers, designated

**Table 2** Risk of Alcohol-Related Problems Comparing Students Who Were Infrequent Binge Drinkers or Frequent Binge Drinkers With Students Who Were Nonbinge Drinkers Among College Students Who Had a Drink in the Past Year\*

Reporting Problem	Nonbinge Drinkers, % (n = 6894)	Infrequent Binge Drinkers		Frequent Binge Drinkers	
		% (n = 4090)	Adjusted OR (95% CI)†	% (n = 3291)	Adjusted OR (95% CI)‡
Have a hangover	30	75	6.28 (5.73-6.87)	90	17.62 (15.50-20.04)
Do something you regret	14	37	3.31 (3.00-3.64)	63	8.98 (8.11-9.95)
Miss a class	8	30	4.66 (4.15-5.24)	61	16.58 (14.73-18.65)
Forget where you were or what you did	8	26	3.62 (3.22-4.06)	54	11.23 (10.05-12.65)
Get behind in school work	6	21	3.70 (3.26-4.20)	46	11.43 (10.09-12.94)
Argue with friends	8	22	3.06 (2.72-3.46)	42	7.77 (6.90-8.74)
Engage in unplanned sexual activity	8	20	2.78 (2.46-3.13)	41	7.17 (6.37-8.06)
Get hurt or injured	2	9	3.65 (3.01-4.43)	23	10.43 (8.70-12.52)
Damage property	2	8	3.09 (2.53-3.77)	22	9.48 (7.86-11.43)
Not use protection when having sex	4	10	2.90 (2.45-3.42)	22	7.11 (6.07-8.34)
Get into trouble with campus or local police	1	4	2.50 (1.92-3.26)	11	6.92 (5.44-8.81)
Require medical treatment of alcohol overdose	<1	<1	NS	1	2.81 (1.39-5.68)
Have five or more alcohol-related problems since the beginning of the school year§	3	14	4.95 (4.17-5.89)	47	25.10 (21.30-29.58)

\*Problem occurred not at all or one or more times. Chi-square comparisons of nonbinge drinkers, infrequent binge drinkers, and frequent binge drinkers and each of the problems are significant at  $P < .001$ , except for alcohol overdose ( $P = .002$ ). Sample sizes vary slightly for each problem because of missing values. OR indicates odds ratio; CI, confidence interval. See Table 1 for explanation of drinking classification.

†Adjusted ORs of infrequent binge drinkers vs nonbinge drinkers are significant at  $P < .001$ .

‡Adjusted ORs of frequent binge drinkers vs nonbinge drinkers are significant at  $P < .001$ , except for alcohol overdose,  $P < .01$ .

§Excludes hangover and includes driving after drinking as one of the problems.

themselves as problem drinkers. In addition, few students have ever sought treatment for a problem with alcohol.

A somewhat larger proportion of students indicated that they had ever had a drinking problem. Slightly more than one fifth (22%) of the frequent binge drinkers thought that they ever had a drinking problem, compared with 12% of the infrequent binge drinkers and 7% of the nonbinge drinkers.

**Table 3** Alcohol-Related Driving Behavior for a 30-Day Period Comparing Students Who Were Infrequent Binge Drinkers or Frequent Binge Drinkers With Students Who Were Nonbinge Drinkers\*

<i>Driving Behavior</i>	<i>Nonbinge Drinkers</i>		<i>Infrequent Binge Drinkers</i>			<i>Frequent Binge Drinkers</i>		
	<i>Men, % (n = 2531)</i>	<i>Women, % (n = 4393)</i>	<i>Men, % (n = 1975)</i>	<i>Women, % (n = 2132)</i>	<i>Adjusted OR (95% CI)†</i>	<i>Men, % (n = 1630)</i>	<i>Women, % (n = 1684)</i>	<i>Adjusted OR (95% CI)‡</i>
Drove after drinking alcohol	20	13	47	33	5.13 (4.67-5.64)	62	49	10.33 (9.34-11.42)
Drove after having five or more drinks	2	1	18	7	22.23 (16.89-29.26)	40	21	74.30 (56.56-97.58)
Rode with a driver who was high or drunk	7	7	23	22	4.73 (4.20-5.32)	53	48	15.97 (14.22-17.95)

\*Chi-square comparisons of nonbinge drinkers, infrequent binge drinkers, and frequent binge drinkers and each of the three driving behaviors were all significant for men and women separately at  $P < .001$ . Sample sizes vary slightly for each question because of missing values. OR indicates odds ratio; CI, confidence interval. See Table 1 for explanation of drinking classification.

†Adjusted OR of infrequent binge drinkers vs nonbinge drinkers (sex combined) are significant at  $P < .001$ .

‡Adjusted OR of frequent binge drinkers vs nonbinge drinkers (sex combined) are significant at  $P < .001$ .

**Table 4** Students Experiencing Secondary Binge Effects (Based on Students Who Were Not Binge Drinkers and Living in Dormitories, Fraternities, or Soronties)\*

Secondary Binge Effect	School's Binging Level				
	Low, % (n = 801)	Middle		High	
		% (n = 1115)	Adjusted OR (95% CI)†	% (n = 1064)	Adjusted OR (95% CI)‡
Been insulted or humiliated	21	30	1.6 (1.3-2.1)	34	1.9 (1.5-2.3)
Had a serious argument or quarrel	13	18	1.3 (1.0-1.7)	20	1.5 (1.1-2.0)
Been pushed, hit, or assaulted	7	10	1.4 (1.0-2.1)	13	2.0 (1.4-2.8)
Had your property damaged	6	13	2.0 (1.4-2.8)	15	2.3 (1.6-3.2)
Had to take care of drunken student	31	47	1.9 (1.6-2.3)	54	2.5 (2.0-3.0)
Had your studying/sleep interrupted	42	64	2.3 (1.9-2.8)	68	2.6 (2.2-3.2)
Experienced an unwanted sexual advance§	15	21	1.7 (1.2-2.3)	26	2.1 (1.5-2.8)
Been a victim of sexual assault or date rape§	2	1	NS	2	NS
Experienced at least one of the above problems	62	82	2.8 (2.3-3.5)	87	4.1 (3.2-5.2)

\*OR indicates odds ratio; CI, confidence interval.

†Adjusted ORs of students at schools with middle levels of binging vs students at schools with low levels are significant at  $P < .05$ .

‡Adjusted ORs of students at schools with high levels of binging vs students at schools with low levels are significant at  $P < .05$ .

§Based on women only.

## Secondary Binge Effects

Table 4 reports on the percentage of nonbinging students who experienced "secondary binge effects," each of eight types of problems due to other students' drinking at each of the three different school types (ie, schools with high, middle, and low binge levels). For seven of the eight problems studied, students at schools with high and middle binge levels were more likely than students at schools with low binge levels to experience problems as a result of the drinking behaviors of others. Odds ratios (adjusted for age, sex, race, marital status, and parents' college education) indicated that nonbinging students at schools with the high binge levels were more likely than nonbinging students at schools with low binge levels to experience secondary binge effects.

The odds of experiencing at least one of the eight problems was roughly 4:1 when students at schools with high binge levels were compared with students at schools with low binge levels.

### **Binge Drinking in High School**

Most students reported the same drinking behavior in high school as in college. Almost half (47%) had not been binge drinkers in high school and did not binge in college, while one fifth (22%) binged in high school and in college. One fifth (22%) of the students were binge drinkers in college but not in high school, while 10% were not binge drinkers at the time of the survey in college, but reported having been binge drinkers in high school.

### **Comment**

To our knowledge, this is the first study that has used a representative national sample, and the first large-scale study to measure binge drinking under a sex-specific definition. Forty-four percent of the college students in this study were classified as binge drinkers. This finding is consistent with the findings of other national studies such as the University of Michigan's Monitoring the Future Project, which found that 41% of college students were binge drinkers,<sup>13</sup> and the Core Alcohol and Drug Survey, which found that 42% of college students were binge drinkers.<sup>5</sup> All three studies used a definition of bingeing over a 2-week period, but the other studies used the same five-drink measure for both sexes. Binge drinking was defined in terms of the number of drinks consumed in a single episode. No attempt was made to specify the duration of time for each episode. Future research might examine whether subgroup differences exist in duration and whether such differences are linked to outcomes.

A possible limitation of surveys using self-reports of drinking behavior pertains to the validity of responses; however, a number of studies have confirmed the validity of self-reports of alcohol and substance use.<sup>22-24</sup> Findings indicate that if a self-report bias exists, it is largely limited to the heaviest use group<sup>25</sup> and should not affect such a conservative estimate of heavy volume as five drinks.

The results confirm that binge drinking is widespread on college campuses. Overall, almost half of all students were binge drinkers. One fifth of all students were frequent binge drinkers (had three or more binge drinking occasions in the past 2 weeks) and were deeply involved in a lifestyle characterized by frequent and deliberate intoxication. Frequent binge drinkers are much more likely to experience serious health and other consequences of their drinking behavior than other students. Almost half of them have experienced five or more alcohol-related problems since the beginning of the school year, one of three report they were hurt or injured, and two in five engaged in unplanned sexual activity. Frequent binge drinkers also report drinking and driving: Three of five male frequent binge drinkers drove after drinking some alcohol in the 30 days prior to the survey, and two of five drove after having five or more drinks. A recent national report that reviewed published studies concluded that alcohol was involved in two thirds of college student suicides, in 90% of campus rapes, and in 95% of violent crime on campus.<sup>26</sup>

Almost a third of the colleges in the study have a majority of students who binge. Not only do these binge drinkers put themselves at risk, they also create problems for their fellow students who are not binge drinking. Students who did

not binge and who reside at schools with high levels of binge drinkers were up to three times as likely to report being bothered by the drinking-related behaviors of other students than students who did not binge and who reside at schools with lower levels of binge drinkers. These problems included being pushed, hit, or assaulted and experiencing an unwanted sexual advance.

Effective interventions face a number of challenges. Drinking is not typically a behavior learned in college and often continues patterns established earlier. In fact, one of three students in the present study was already a binge drinker in the year before college.

The prominence of drinking on college campuses reflects its importance in the wider society, but drinking has traditionally occupied a unique place in campus life. Despite the overall decline in drinking in US society, recent time-trend studies have failed to show a corresponding decrease in binge drinking on college campuses.<sup>3,13</sup> The variation in binge drinking rates among the colleges in this study suggest that colleges may create and unwittingly perpetuate their own drinking cultures through selection, tradition, policy, and other strategies. On many campuses, drinking behavior that would elsewhere be classified as alcohol abuse may be socially acceptable, or even socially attractive, despite its documented implication in automobile crashes, other injury, violence, suicide, and high-risk sexual behavior.

The scope of the problem makes immediate results of any interventions highly unlikely. Colleges need to be committed to large-scale and long-term behavior change strategies, including referral of alcohol abusers to appropriate treatment. Frequent binge drinkers on college campuses are similar to other alcohol abusers elsewhere in their tendency to deny that they have a problem. Indeed, their youth, the visibility of others who drink the same way, and the shelter of the college community may make them less likely to recognize the problem. In addition to addressing the health problems of alcohol abusers, a major effort should address the large group of students who are not binge drinkers on campus who are adversely affected by the alcohol-related behavior of binge drinkers.

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