

Trends in College Binge Drinking During a Period of Increased Prevention Efforts

Findings From 4 Harvard School of Public Health College Alcohol Study Surveys: 1993–2001

Henry Wechsler, PhD; Jae Eun Lee, DrPH; Meichun Kuo, ScD;
Mark Seibring, BA, BS; Toben F. Nelson, MS; Hang Lee, PhD

Abstract. The 2001 Harvard School of Public Health College Alcohol Study surveyed students at 119 4-year colleges that participated in the 1993, 1997, and 1999 studies. Responses in the 4 survey years were compared to determine trends in heavy alcohol use, alcohol-related problems, and encounters with college and community prevention efforts. In 2001, approximately 2 in 5 (44.4%) college students reported binge drinking, a rate almost identical to rates in the previous 3 surveys. Very little change in overall binge drinking occurred at the individual college level. The percentages of abstainers and frequent binge drinkers increased, a polarization of drinking behavior first noted in 1997. A sharp rise in frequent binge drinking was noted among students attending all-women's colleges. Other significant changes included increases in immoderate drinking and harm among drinkers. More students lived in substance-free housing and encountered college educational efforts and sanctions resulting from their alcohol use.

Key Words: alcohol, alcohol-related problems, binge drinking, college students, secondhand effects of alcohol, prevention

Hheavy episodic alcohol use, or binge drinking, and the resulting problems gained national recognition in the 1990s as the number one public health problem affecting college students. Since the release of the first Harvard School of Public Health College Alcohol Study (CAS),¹ increased awareness of this problem has resulted in major governmental and national actions.² The Centers for Disease Control and Prevention (CDC) now provide measures of binge drinking in their state-by-state reports.³ Both houses of Congress have passed resolutions asking college presidents to take steps to address this problem,^{4,5} and the US Surgeon General established a national health goal of reducing college binge drinking by 50% by the year

2010.⁶ The National Institute on Alcoholism and Alcohol Abuse (NIAAA) formed a special task force to make recommendations to address the problem.⁷ Binge drinking has even received global attention from the World Health Organization, which convened a conference to address the topic.⁸

Several prominent organizations and key leaders have accepted this call to action. Mothers Against Drunk Driving developed a new initiative to address college binge drinking and is campaigning to open new chapters on college campuses.⁹ The Robert Wood Johnson Foundation funded a multimillion-dollar grant program in 10 college communities to work on the problem.¹⁰ In addition, The National Association of State Universities and Land-Grant Colleges sponsored a national media campaign to draw attention to the issue,¹¹ and many local and regional coalitions have formed to develop interventions to reduce heavy drinking among college students.

During the 1990s, the increased national attention paid to college binge drinking prompted colleges and universities to initiate or increase their prevention efforts.^{2,12} The actions taken to date, however, have focused on educating or changing the perceptions of the drinkers themselves, providing counseling or short-term treatment, and imposing sanctions for the most severe offenses.¹³ Features of the environment that promote heavy alcohol use, such as college drinking traditions, lax college or community policies and enforcement, easy accessibility to cheap alcohol in high volume, and gaps in service networks have received far less attention than other prevention efforts.^{13–15}

Several other studies that measure college student binge drinking have shown that little or no change in students' heavy-drinking patterns has occurred. The *Monitoring the Future: National Survey Results on Drug Use, 1975–2000* reported that the rate of consuming 5 or more drinks in a row in the past 2 weeks for college students who are 1 to 4

All of the authors are with the Department of Health and Social Behavior at the Harvard School of Public Health in Boston. Hang Lee is also with the Massachusetts General Hospital in Boston.

years beyond high school was 40.2% in 1993 and remained at 40.0% in 1999.¹⁶ The most recently published CDC survey that looked specifically at college students found that, in 1995, 41.5% of college students aged 18 to 24 years had consumed 5 or more drinks in a row in the preceding 30 days.¹⁷

In the 1999 CAS, we found that binge drinking was often accompanied by educational difficulties, psychosocial problems, antisocial behaviors, injuries, overdoses, high-risk sexual behaviors, and other risk taking, such as alcohol-impaired driving.¹² A recent study¹⁸ indicated that, under existing patterns of alcohol use, nearly 1 in 3 college students (31.6%) qualified for a formal diagnosis of alcohol abuse and 1 in 17 (6.3%) could be diagnosed as *alcohol dependent*, according to criteria in the *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition (*DSM-IV*).¹⁹

The consequences of college students' heavy drinking are not limited to the drinkers themselves. Students who attended schools with high rates of heavy drinking experienced a greater number of secondhand effects, including disruption of sleep or studies; property damage; and verbal, physical, or sexual violence.²⁰ In addition, residents of neighborhoods near colleges characterized as heavy-drinking schools experienced higher rates of noise disruptions, property damage, and police visits than people who lived in neighborhoods surrounding schools with lower drinking rates and people who did not live near a college.²¹

We had an opportunity in 2001 to resurvey the same colleges included in the previous CAS samples to determine the extent to which changes in alcohol problems and use patterns had occurred in the preceding 2 years. In this report, we present the 2001 findings and a trend analysis examining changes in rates from the 1993, 1997, 1999, and 2001 surveys.^{1,12,22}

METHOD

Sample

The 2001 CAS surveyed students at 120 of the colleges that participated in each of the previous three surveys. The participating schools were located in 38 states and the District of Columbia. In the original 1993 survey, we selected 140 schools from a list provided by the American Council on Education to provide a representative sample of accredited 4-year US colleges and universities. The attrition of 20 schools was primarily a result of institutions' inability to provide a sample of students and mailing addresses to meet the time constraints of the survey.

Administrators at each participating school used the same procedure as that used in conducting previous CAS surveys to provide a list of 215 randomly selected students from all full-time undergraduate students enrolled during the 2000–2001 school year. Details of the previous sampling methods are described elsewhere.^{1,12,22}

In conducting the data analyses, we excluded 1 college with a response rate that was substantially lower than the others, leaving 119 schools. The inclusion criteria differed

from previous survey years. We drew on results from 113 schools that we had surveyed earlier and reintroduced 6 schools that had been dropped from previous analyses. Thus, rates for earlier years cited in this report are slightly different from those reported in other articles that were based on CAS data.^{1,12,22} However, when we compared the binge-drinking rates of the 119 schools with the corresponding rates of all schools in each survey year, we found they were identical. Dropping the low-response schools did not change the results of the survey.

The sample of 119 colleges represents a national cross-section of students enrolled at 4-year colleges. Sixty-nine percent of the responders attended public colleges and 31% attended private colleges, which approximates the US national distribution of full-time 4-year college students, with 68% attending public and 32% attending private schools.²³ Forty-seven percent of the responders attended large colleges (> 10,000 students), 23% were at medium-sized colleges (5,001–10,000 students), and 29% were enrolled in small colleges (< 5,001 students). The US national distribution is 37%, 24%, and 40%, respectively.²³ Sixty-nine percent of the responders attended schools in large or medium-sized cities, compared with 71% of students nationwide.²³ Thirteen percent of the students attended schools with a religious affiliation, compared with 16% nationwide²³; and 5% percent of the students attended all-women's colleges.

The 2001 sample consisted of 64% women, a rate higher than the national rate of undergraduate women, resulting in part from the inclusion of 5 women's colleges. About 3 in 4 students (74%) were White, and 1 in 2 (50.2%) was under the legal drinking age (ie, younger than 21 y). We noted significant changes in the demographic characteristics of the student samples over the 4 surveys. Therefore, to compare prevalence rates across survey years, we weighted the data to the population distribution of each school in 1993 in terms of sex/gender, age, and race/ethnicity. We used the weighted data in all analyses.

Data Weighting and Binge-Rate Standardization

The demographic characteristics of the student sample for each school may not be a perfect reflection of the true demographic characteristics for the population of that school and may bias our estimate of binge drinking. For example, more women than men responded to the survey. However, the binge rate is higher for men than for women, and this can lead to selection bias in the crude estimate of the binge rate. In addition, both sample and population demographic characteristics can change from year to year; and binge rates can appear to change when, in fact, the changes may reflect only a given year's change of respondents or school population for a demographic group.

To rule out attributing change in binge-drinking rates to changes in demographic characteristics in each survey year, we based estimations of the binge rates in each survey and the longitudinal comparisons on a direct standardization procedure over 8 strata (ie, gender × 2 age groups [< 22 vs

others] and 2 ethnic groups [White vs others]) that used each school's true demographic characteristic in 1993 as the reference. For analyses that used individual student-level data, we weighted the individual student-level binge-drinking response by using the weight structure that we had used for the standardization. We could then compare the binge rate over time, given the assumption that demographic characteristics remained constant, and could also reduce the potential selection bias in the prevalence rate for each survey year. The adjusted rates can, therefore, be reliably interpreted over time.

Questionnaire

The 2001 survey questionnaire asked respondents to answer a series of questions about their alcohol use and associated problems, as well as about their tobacco and other drug use, their lifestyles, and demographic and background characteristics. Additional questions asked students about their experience with prevention programs and college alcohol policies. We repeated standard questions from questionnaires that were used in the 1993, 1997, and 1999 surveys and that were adapted from previous large-scale, national studies.

The questionnaire instructed participants to define a "drink" in equivalent amounts of alcohol: a 12-oz (360-mL) bottle or can 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 or 37mL) of liquor either straight or in a mixed drink.

Main Outcome Measures

We employed the measure of binge drinking or heavy episodic drinking as a primary outcome measure that is consistent with previous CAS surveys. This measure of alcohol use is a standard metric in research on this topic.^{2,24} We defined binge drinking as the consumption of at least 5 drinks in a row for men or 4 drinks in a row for women during the 2 weeks before completion of the questionnaire. The CAS gender-specific measure of binge drinking was constructed from responses to 4 questions about (a) gender, (b) most recent drinking experience, (c) drinking 5 or more drinks in a row during the past 2 weeks, and (d) drinking 4 drinks in a row during the past 2 weeks. Binge drinking is strongly associated with adverse social consequences among college students.^{1,12,21,22} An analysis of 1993 CAS data demonstrated that a gender-specific definition ("5/4") of binge drinking provides a measure of equivalent alcohol-related problems for college men and women.²⁵ We deleted respondents with missing data on these questions from the analysis (2.6% in 1993, 1.4% in 1997, 2.3% in 1999, and 1.1% in 2001).

Frequent binge drinkers were students who had binged 3 or more times in the past 2 weeks, whereas *occasional binge drinkers* were those who had binged 1 or 2 times in the same period. Non-binge drinkers were students who had consumed alcohol in the past year but had not binged in the previous 2 weeks. Abstainers were those students who had not consumed any alcohol in the past year. We used the

same 5/4 measure in defining high school binge drinking as the usual amount of alcohol consumed per occasion during the last year in high school.

In addition to using the measure of binge drinking, we assessed student patterns of alcohol use by asking respondents who drank any alcohol in the past 30 days the following four questions: (a) how often they 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*); (b) how many drinks they usually consumed on the occasions when they drank alcohol in the past month (response categories ranged from *did not drink in past 30 days* to *9 or more drinks*); (c) how important getting drunk was as a reason to drink (response categories: *very important*, *important*, *somewhat important*, and *not at all important*); and (d) how often they drank enough to get drunk in the past 30 days (meaning *unsteady*, *dizzy*, or *sick to your stomach*), with response categories identical to those in the first question.

Students who drank alcohol in the previous year were asked a series of questions about their experience of alcohol-related problems, including 12 health and behavioral consequences of their own drinking. The personal harms questions ranged from academic difficulties (such as missing a class or getting behind in schoolwork), to physical and sexual violence and serious medical problems (eg, alcohol overdose).

All students were asked a series of 8 questions about their experiences of the consequences of other students' drinking (secondhand effects) during the current school year. We conducted analyses of the secondhand effects of alcohol use among non-binge drinkers and residents of on-campus residence halls and fraternity/sorority houses. Data on alcohol-related sexual assault and unwanted sexual advances are presented for women only.

We classified colleges as high binge (with more than 50% of students binge drinking); middle level (36%–50%); and low binge (35% or lower) on the basis of the aggregated binge-drinking behavior of their students.

Mailing and Response Rate

Following the same practice as that used in the 3 prior surveys, we mailed questionnaires directly to students beginning in February and sent 3 separate mailings within a minimum span of 3 weeks. The initial mailing consisted of a letter of invitation to participate in the study and a questionnaire. We followed this mailing with a reminder postcard and a separately mailed second questionnaire. Mailings were different for each school, and we scheduled them to avoid the period immediately preceding and following spring break to capture behavior that occurred on campus and to avoid responses that reflected behavior during spring vacation.

Student responses to the survey were voluntary and anonymous, and students were told they did not have to answer any question that made them uncomfortable. As a result, the study received exempt status from the institutional review committee. To encourage responses, we offered cash prizes. We entered into a drawing the names of

students who returned a separate postcard indicating that they had completed the survey. The prizes were one \$1,500 award to a student whose name was drawn from among students responding within 1 week of the first mailing, and two \$750 awards and five \$100 awards to students selected from all those who responded.

College response rates differed for each of the 4 survey years: 52% in 2001 (range 22%–86%); 59% in 1999 (range 27%–83%); 59% in 1997 (range 29%–88%), and 70% in 1993 (range 48%–100%). However, the response rates at individual colleges were not associated with the binge rates. We used correlation analysis to examine the potential bias that might have been introduced by nonresponders. First, we compared responses of students who responded early with those who responded late. We found no statistically significant difference in rates of binge drinking between students who responded before and after the second mailing in 2001 (44% vs 43%), $\chi^2(1, N = 10,904) = .9223$; $p = .3369$. The Pearson correlation coefficient between a college's binge rate and its response rate was $-.057$ ($p = .536$) in 1993; $.044$ ($p = .635$) in 1997; $.002$ ($p = .984$) in 1999; and $.170$ ($p = .064$) in 2001. We included response rates as a continuous covariate in multiple logistic regression models in all of the analyses. In addition, we sent a short form of the questionnaire, including a question about drinking in 2001, to a sample of students who did not return the original questionnaire, and more than 500 students responded. We found no significant differences in rates of past year alcohol use (79.8% vs 80.9%), $\chi^2(1, N = 10,904) = .29$; $p = .59$, for those who answered the short survey compared with those who responded to the entire questionnaire. This pattern was consistent across major demographic variables of age and gender and over surveys.

Data Analysis

To facilitate comparisons with 1993, 1997, and 1999 data, we used only data from the 119 schools that participated in all 4 survey years. Thus, the 2001 findings are slightly (usually 1% or less) different from those previously reported in articles that used data for 140 colleges in 1993, 116 in 1997, and 119 in 1999.^{1,12,22}

We conducted an overall trend analysis in binge-drinking rates among 119 schools with 4 time points. We used repeated measures in the longitudinal trend analysis to examine the change of school-level binge-drinking rates over time. We used the generalized estimating equations (GEE) approach to fit the longitudinal models. In the model, we included a year variable (year = 0, 4, 6, or 8 for 1993, 1997, 1999, or 2001, respectively) to examine whether a linear time trend in binge-drinking rate was apparent from 1993 to 2001. We also included response rate and the interaction between response rate and the year variable in the model.

We used chi-square tests to compare student characteristics and outcomes of interest across the 4 survey years. Directly standardized binge rates were reported. We used chi-square analyses to perform comparisons of prevalence

rates. We used the multiple logistic regression technique to assess the relationship between binge drinking and its correlates. A test for linear trends of binge drinking over time was also performed within the logistic regression models. Adjusted odds ratios (OR) and 95% confidence intervals (CI) are reported. We used the GEE approach to fitting the logistic regression models to account for clustered outcomes arising in our sampling scheme^{26,27}; we used the SAS statistical software package in all analyses we conducted.²⁸

RESULTS

Composition of the Student Sample

The characteristics of the samples from each of the 4 survey years included in the present analysis differed in several ways. A majority of the sample participants in each survey year were women (57% in 1993, 60% in 1997, 61% in 1999, and 64% in 2001), but trend analysis indicated that the proportion of females in 2001 constituted a significant increase from 1993, $\chi^2(1, N = 26,129) = 131.9$; $p < .0001$. In contrast, the percentage of White students was high each survey year—80% in 1993, 76% in 1997, 75% in 1999, and 74% in 2001—but decreased throughout the survey years, whereas other racial groups increased in each year, $\chi^2(1, N = 25,811) = 108.6$; $p < .0001$. We noted increases over time for students under the age of 21 (45% in 1993, 49% in 1997, 50% in 1999, and 50% in 2001), $\chi^2(1, N = 26,149) = 62.9$; $p < .0001$; freshmen (20% in 1993, 24% in 1997, 23% in 1999, and 23% in 2001), $\chi^2(1, N = 26,103) = 30.9$; $p < .0001$; and sophomores (19% in 1993, 21% in 1997, 22% in 1999, and 22% in 2001), $\chi^2(1, N = 26,103) = 19.9$; $p < .0001$. The percentages of older students and seniors decreased.

We also found some significant shifts in residential characteristics of the sample. A higher proportion of students lived in on-campus residence halls (32% in 1993, 38% in 1997, 38% in 1999, and 36% in 2001), $\chi^2(1, N = 26,037) = 62.9$; $p < .0001$; in substance-free housing (17% in 1993, 20% in 1997, 23% in 1999, and 28% in 2001), $\chi^2(1, N = 8,797) = 160.0$, $p < .0001$; and in off-campus quarters with a spouse (10% in 1993, 19% in 1997, 18% in 1999, and 16% in 2001), $\chi^2(1, N = 14,286) = 127.8$; $p < .0001$. Fewer students lived off campus with their parents (35% in 1993, 28% in 1997, 25% in 1999, and 32% in 2001), $\chi^2(1, N = 14,286) = 17.2$; $p < .0001$. We also found a significant decline in the percentages of respondents who belonged to fraternities or sororities (16% in 1993, 14% in 1997, 14% in 1999, and 12% in 2001), $\chi^2(1, N = 26,012) = 60.3$; $p < .0001$; and in the percentages who lived in Greek houses (3.3% in 1993, 2.9% in 1997, 2.7% in 1999, and 2.5% in 2001), $\chi^2(1, N = 26,037) = 16.2$; $p < .0001$.

College Binge-Drinking Rates Over Time

Between 1993 and 2001, we observed an increase in the binge-drinking rate at 62 (52%) of the 119 participating colleges, although the change was statistically significant at only 5 schools (8%). By contrast, we observed a decrease in the binge-drinking rate at 57 (48%) schools, but it was sta-

tistically significant at only 5 schools (9%). We conducted an overall trend analysis in the school-level binge-drinking rate among 119 schools at four time points (Table 1). These data showed no linear trend in the school-level binge-drinking rate over time. In addition, we observed no significant differences in binge drinking rates over the 4 survey years

among the schools with high, middle, and low response rates, as well as no interaction between survey year and response rate.

Student Drinking Behavior

Drinking patterns of students over the 4 surveys are shown in Table 2. Remarkably similar proportions of students were classified as binge drinkers in 2001 as in previous survey years (44.4%). The proportion of binge drinkers, with few exceptions, also did not change between 1993 and 2001 in most student and college subgroups (see Table 3). The rate of binge drinking among students living with a spouse off campus was significantly higher in 2001 than in earlier years. We noted significant decreases in binge drinking among Hispanic and Native American students and residents of fraternity or sorority houses but noted no similar decrease in fraternity or sorority members overall.

Although the overall rate of binge drinking did not change between 1993 and 2001, evidence of a trend toward polarization of drinking behavior has continued since the second CAS survey. About 1 in 7 (16%) students abstained from alcohol during the past year and 1 in 5 (20%) engaged in frequent binge drinking in 1993, whereas 1 in 5 (19%)

TABLE 1
Repeated Measures Binge-Drinking Rate
Among 119 Schools (N = 476)

Variable	Coeff	SE	p
Intercept (rate in 1993)	0.4388	0.0232	< .0001
Year (0, 4, 6, 8)	0.0033	0.0028	.2483
Response rate			
High (> 70%)	Reference		—
Middle (50–70%)	–0.0239	0.0318	.4516
Low (< 50%)	2.6254	2.3185	.2575
Year × Low Response Rate interaction	–0.0274	0.0239	.2515

Note. Year was coded as 0 (1993), 4 (1997), 6 (1999), and 8 (2001).

TABLE 2
College Student Patterns of Alcohol Use: 1993, 1997, 1999, and 2001

Drinking pattern	% prevalence in each survey				Change over time		Test for linear time trend p
	1993 ^a	1997 ^b	1999 ^c	2001 ^d	OR	95% CI	
Past year drinking							
Total	83.6	80.3	79.8	80.7	0.82	0.76, 0.89***	< .0001
Female	82.9	79.7	80.5	81.3	0.90	0.81, 0.99*	.0039
Male	84.2	81.0	79.0	79.9	0.75	0.66, 0.84***	< .0001
Binge drinkers							
Total	43.9	43.2	44.5	44.4	1.02	0.96, 1.09	.4354
Female	39.0	38.4	39.4	40.9	1.08	1.00, 1.17	.1078
Male	49.2	48.5	50.2	48.6	0.97	0.89, 1.07	.9970
Abstainers							
Total	16.4	19.6	19.8	19.3	1.22	1.13, 1.32***	< .0001
Female	17.0	20.3	19.2	18.7	1.12	1.02, 1.24*	.0042
Male	15.7	18.9	20.5	20.1	1.35	1.19, 1.52***	< .0001
Non-binge drinkers							
Total	39.7	37.2	35.7	36.3	0.86	0.81, 0.92***	< .0001
Female	44.0	41.4	41.4	40.4	0.87	0.80, 0.93***	< .0001
Male	35.1	32.6	29.4	31.3	0.85	0.77, 0.93***	< .0001
Occasional binge drinkers							
Total	24.3	22.2	21.9	21.6	0.86	0.80, 0.92***	< .0001
Female	21.9	19.4	19.2	20.0	0.89	0.81, 0.97**	.0005
Male	26.8	25.3	24.9	23.4	0.84	0.75, 0.93***	.0004
Frequent binge drinkers							
Total	19.7	21.0	22.6	22.8	1.21	1.13, 1.30***	< .0001
Female	17.1	18.9	20.3	20.9	1.28	1.17, 1.40***	< .0001
Male	22.4	23.2	25.3	25.2	1.16	1.05, 1.29***	.0006

Note. OR = odds ratio; CI = confidence interval.
^an = 15,282. ^bn = 14,428. ^cn = 13,954. ^dn = 10,904.
 *p < .05; **p < .01; ***p < .001.

TABLE 3
Patterns of College Student Binge Drinking Among Subpopulations, 1993, 1997, 1999, and 2001

Characteristic	% prevalence in each survey				Change over time		Test for linear time trend <i>p</i>
	1993 ^a	1997 ^b	1999 ^c	2001 ^d	OR	95% CI	
Gender							
Female	39.0	38.4	39.4	40.9	1.08	1.00, 1.17	.1078
Male	49.2	48.5	50.2	48.6	0.97	0.89, 1.07	.9970
Ethnicity							
Non-Hispanic	44.3	43.7	44.8	45.2	1.04	0.97, 1.12	.2620
Hispanic	39.7	37.7	41.0	34.4	0.80	0.65, 0.97*	.2166
White	49.5	48.2	50.1	50.2	1.03	0.96, 1.11	.3406
Black/African American	16.7	18.5	17.5	21.7	1.38	0.97, 1.68	.1455
Asian/Pacific Islander	23.1	24.4	23.3	26.2	1.18	0.88, 1.57	.4384
Native American Indian/ Other	39.3	37.9	42.6	33.6	0.78	0.65, 0.94**	.1812
Age (y)							
< 21	45.5	44.6	44.9	43.6	0.93	0.85, 1.01	.1172
21–23	48.1	47.5	50.3	50.2	1.09	0.98, 1.20	.0558
≥ 24	28.5	28.8	29.1	30.9	1.12	0.92, 1.37	.3325
Year in school							
Freshman	42.9	42.8	42.0	42.4	0.98	0.85, 1.12	.6591
Sophomore	45.4	44.6	44.9	42.8	0.90	0.80, 1.01	.1281
Junior	44.4	44.8	46.3	45.9	1.06	0.94, 1.20	.2375
Senior	42.8	41.7	45.6	44.9	1.09	0.97, 1.21	.0645
Residence							
Non-substance-free residence hall	46.7	45.8	44.5	45.3	0.94	0.85, 1.05	.1478
Substance-free residence hall	34.7	32.5	32.1	35.3	1.03	0.80, 1.33	.9912
Fraternity/sorority	83.4	82.6	80.3	75.4	0.61	0.42, 0.89*	.0237
Off campus, alone, or with a roommate	54.1	53.5	56.2	54.5	1.02	0.89, 1.15	.4451
Off campus, with a spouse	18.5	20.8	22.9	26.5	1.60	1.24, 2.05***	.0002
Off campus, with parents	29.7	28.3	29.8	30.1	1.02	0.88, 1.18	.8096
Fraternity/sorority member	67.4	67.4	65.2	64.3	0.87	0.74, 1.03	.1030

Note. OR = odds ratio; CI = confidence interval.

^a*n* = 15,282. ^b*n* = 14,428. ^c*n* = 13,954. ^d*n* = 10,904.

p* < .05; *p* < .01; ****p* < .001.

students was an abstainer in 2001 and 1 in 4 (23%) was a frequent binge drinker.

The percentage of students who reported retrospectively that they had engaged in binge drinking during high school (32% in 1993, 30% in 1997, 30% in 1999, and 26% in 2001), $\chi^2(1, N = 25,400) = 128.3$; $p < .0001$, declined significantly.

The rise in abstaining and frequent binge drinking between 1993 and 2001 was significant in most student and college subgroups, with minor exceptions. We found an increase in abstention but not in frequent binge drinking among Hispanics (15% in 1993 and 19% in 2001; OR = 1.42; 95% CI = 1.09–1.84; $p = .0089$); Native Americans (16% in 1993 and 22% in 2001; OR = 1.44; 95% CI = 1.13–1.83; $p = .0031$); students who lived in residence halls (18% in 1993 and 21% in 2001; OR = 1.22; 95% CI = 1.07–1.38; $p = .0020$); and fraternity or sorority houses (1% in 1993 and 6% in 2001; OR = 5.37; 95% CI = 2.08–13.88;

$p < .0001$); those living with parents off campus (22% in 1993 and 27% in 2001; OR = 1.30; 95% CI = 1.09–1.55; $p = .0029$); students attending schools located in the Northeast (12% in 1993 and 15% in 2001; OR = 1.25; 95% CI = 1.05–1.48; $p = .0122$); and rural areas/small towns (14% in 1993 and 19% in 2001; OR = 1.41; 95% CI = 1.20–1.26; $p < .0001$).

By contrast, a rise in frequent binge drinking but not in abstention was reported among seniors (19% in 1993 and 23% in 2001; OR = 1.22; 95% CI = 1.05–1.42; $p = .0081$); students who were binge drinkers in high school (40% in 1993 and 46% in 2001; OR = 1.29; 95% CI = 1.17–1.43; $p < .0001$); those living off campus with a spouse (3% in 1993 and 8% in 2001; OR = 2.33; 95% CI = 1.45–1.76; $p < .0001$); students attending commuter schools (11% in 1993 and 15% in 2001; OR = 1.40; 95% CI = 1.08–1.80; $p = .0100$); those attending highly competitive schools (17% in 1993 and 20% in 2001; OR = 1.23; 95% CI = 1.08–1.40;

$p = .0024$); and students in schools located in the western region of the US (13% in 1993 and 15% in 2001; OR = 1.23; 95% CI = 1.04–1.46; $p = .0186$). The rate of abstaining in all-women’s colleges decreased significantly over the 4 study years (26% in 1993 and 21% in 2001; OR = 0.75; 95% CI = 0.64–0.87; $p < .0001$); whereas frequent binge drinking increased in those schools (5% in 1993 and 12% in 2001; OR = 2.40; 95% CI = 1.85–3.11; $p < .0001$).

The number of students who reported an extreme drinking

style increased significantly between 1993 and 2001. A significant increase in heavy drinking that was consistent with the observation of increases in frequent binge drinking occurred on measures of 10 or more drinking occasions in the past month, including drinking to get drunk as a reason for drinking and drunkenness 3 or more times in the past month (summarized in Table 4). The rate of having 4 or more drinks on an occasion also increased from 47% in 1993 to 51% in 2001 (OR = 1.19; 95% CI = 1.11–1.28; $p < .0001$).

TABLE 4
Drinking Styles of Students Who Consumed Alcohol, 1993, 1997, 1999, and 2001

Drinking style	% prevalence in each survey				Change over time		Test for linear time trend p
	1993 ^a	1997 ^b	1999 ^c	2001 ^d	2001 vs 1993 OR	95% CI	
Drank on 10 or more occasions in the past 30 days							
Total	18.1	21.1	23.1	22.6	1.33	1.21, 1.46***	< .0001
Women	12.3	15.1	16.4	16.8	1.44	1.27, 1.64***	< .0001
Men	23.9	27.2	30.1	29.2	1.31	1.14, 1.50***	< .0001
Was drunk \geq 3 times in the past 30 days							
Total	23.4	29.0	30.2	29.4	1.36	1.25, 1.48***	< .0001
Women	18.9	24.4	25.0	24.6	1.40	1.26, 1.55***	< .0001
Men	28.0	33.6	35.8	34.9	1.38	1.22, 1.57***	< .0001
Drinks to get drunk [†]							
Total	39.9	53.5	47.7	48.2	1.40	1.31, 1.51***	< .0001
Women	35.6	48.4	42.4	42.4	1.33	1.23, 1.45***	< .0001
Men	44.4	59.1	53.8	55.2	1.54	1.39, 1.71***	< .0001

Note. Only students who drank alcohol in the last year are included. OR = odds ratio; CI = confidence interval.

[†]Report that drinking “to get drunk” is an important reason for drinking.

^a $n = 12,708$. ^b $n = 11,506$. ^c $n = 10,825$. ^d $n = 8,783$.

*** $p < .001$.

TABLE 5
Changes in Binge-Drinking Rates Among Women at All-Women’s and Coeducational Colleges, 1993, 1997, 1999, 2001

Variable	1993	1997	1999	2001	OR	95% CI [†]
% of students in all-women’s schools	2.8	4.5	4.5	4.7		
Binge						
All-women’s	24.5	27.4	29.8	32.1	1.36	0.99, 1.86
Coed (only women)	39.3	38.7	39.7	41.2	1.08	0.99, 1.17
Abstainers						
All-women’s	25.9	25.9	20.9	20.7	0.76	0.63, 0.93**
Coed (only women)	16.8	20.3	19.1	18.6	1.13	1.01, 1.26*
Frequent binge						
All-women’s	5.3	8.9	12.9	11.9	2.19	1.60, 2.99***
Coed (only women)	17.4	19.3	20.5	21.2	1.27	1.15, 1.40***

Note. OR = odds ratio; CI = confidence interval.

[†]Controlled for age, race, and response rate.

* $p < .05$; ** $p < .01$; *** $p < .001$.

Most of the increase occurred between 1993 and 1997, and the change was not strong between 1997 and 2001.

Drinking Behavior Among Women (All-Women’s Schools vs Coeducational Schools)

To examine the changes in binge drinking among students at all-women’s colleges more closely, we separately examined women’s college students and women who attended coeducational colleges over time (see Table 5). Frequent binge drinking increased among students at all-women’s colleges and among women attending coeducational schools, but the increase was not of the same magnitude as the change among students at all-women’s colleges. Abstaining from alcohol decreased among students at all-women’s colleges, whereas we found a small but significant increase in the number of abstainers among women attending coed schools. We noted an increase in binge drinking among students at all-women’s colleges, although it did not reach statistical significance, but there was no change in binge-drinking rates among women at coeducational colleges.

Alcohol-Related Problems

Problems related to alcohol use among students who drank alcohol during the past 30 days remained steady or increased slightly over the 8 years of the study (summarized in Table 6).

Among students who consumed alcohol in the past 30

days, we observed significant increases between 1993 and 2001 in their having trouble with the police (4.6% in 1993 to 6.5% in 2001) and getting hurt or injured (9.3% in 1993 to 12.8% in 2001). We also noted significant, though slight, increases in academic and interpersonal problems, although most of the changes in these rates occurred between 1993 and 1997. One in 5 drinkers reported experiencing 5 or more problems related to their alcohol use, a rate that was consistent with previous results.

In addition, we observed a significant increase among all students in reports of riding in motor vehicles with drivers who were drunk or high (18.4% in 1993 and 23.2% in 2001; OR = 1.34; 95% CI = 1.24–1.44; *p* < .0001).

Secondhand Effects of Alcohol Use

The 2001 study found that high proportions of non-binge drinkers and abstainers who lived in on-campus housing or in a fraternity or sorority house experienced negative effects from their peers’ drinking, which was similar to our findings in previous studies (Table 7). The secondhand effects experienced most frequently were having study/sleep interrupted (60%), having to take care of a drunken student (48%), and being insulted or humiliated (29%). Fifty-five percent of the students surveyed had experienced at least 2 secondhand effects, but no clear pattern of change in the rate of secondhand effects emerged over the 4 study years.

TABLE 6
Alcohol-Related Problems Among Students Who Drank Alcohol, 1993, 1997, 1999, and 2001

Alcohol-related problem	Prevalence in %				Change over time		
	1993 ^a	1997 ^b	1999 ^c	2001 ^d	OR	95% CI	Test for linear time trend <i>p</i>
Miss a class	26.9	31.1	29.9	29.5	1.14	1.06, 1.23***	< .0001
Get behind in school work	20.5	24.1	24.1	21.6	1.07	0.99, 1.16	.0004
Do something you regret	32.1	37.0	36.1	35.0	1.13	1.06, 1.21***	< .0001
Forget where you were or what you did	24.7	27.4	27.1	26.8	1.12	1.03, 1.21**	.0005
Argue with friends	19.6	24.0	22.5	22.9	1.22	1.13, 1.31***	< .0001
Engage in unplanned sexual activities	19.2	23.3	21.6	21.3	1.14	1.06, 1.24***	.0002
Not use protection when you had sex	9.8	11.2	10.3	10.4	1.07	0.97, 1.19	.1840
Damage property	9.3	11.7	10.8	10.7	1.16	1.04, 1.30**	.0031
Get into trouble with the campus or local police	4.6	6.4	5.8	6.5	1.43	1.25, 1.65***	< .0001
Get hurt or injured	9.3	12.0	12.4	12.8	1.42	1.29, 1.57***	< .0001
Require medical treatment for an overdose	0.5	0.6	0.6	0.8	1.76	1.07, 2.91*	.0334
Drove after drinking	26.6	29.5	28.8	29.0	1.12	1.04, 1.21**	.0010
Have ≥ 5 different alcohol-related problems	16.6	20.8	19.9	20.3	1.28	1.27, 1.39***	< .0001

Note. Analysis limited to only those who drank alcohol in the past year. % is the prevalence of those who had the problem one or more times since the beginning of the school year. OR = odds ratio; CI = confidence interval.

^a*n* = 12,708. ^b*n* = 11,506. ^c*n* = 10,825. ^d*n* = 8,783.

p* < .05; *p* < .01; ****p* < .001.

TABLE 7
Secondhand Binge-Drinking Effects on Non-Binge Drinkers in Residence Hall or Fraternity/Sorority House

Secondhand effect	% prevalence in each survey				Change over time		
	1993 ^a	1997 ^b	1999 ^c	2001 ^d	2001 vs 1993		Test for linear time trend <i>p</i>
					OR	95% CI	
Been insulted or humiliated	29.5	28.9	29.5	29.2	0.99	0.86, 1.14	.9423
Had a serious argument and quarrel	16.8	19.0	19.2	19.0	1.16	0.97, 1.39	.0700
Been pushed, hit, or assaulted	10.4	9.8	10.0	8.7	0.82	0.65, 1.04	.1793
Had your property damaged	12.7	13.8	13.1	15.2	1.23	1.00, 1.52	.1161
Had to take care of drunken student	45.3	49.6	50.0	47.6	1.10	0.96, 1.26	.0330
Had your studying/sleeping interrupted	59.9	61.9	58.2	60.0	1.00	0.87, 1.16	.5890
Experienced an unwanted sexual advance	16.5	18.7	18.9	19.5	1.23	1.04, 1.46*	.0169
Been a victim of sexual assault or date rape†	1.9	2.7	1.1	1.0	0.51	0.28, 0.93*	.0407
≥ 2 secondhand effects	53.1	55.5	55.4	55.2	1.09	0.94, 1.26	.1636

Note. Included only abstainers and non-binge drinkers in dorms or fraternity/sorority house. OR = odds ratio; CI = confidence interval.

†Women only.

^a*n* = 12,708. ^b*n* = 11,506. ^c*n* = 10,825. ^d*n* = 8,783.

**p* < .05.

We examined the secondhand effects of alcohol use across types of living arrangements. The rate of secondhand effects was higher among residents in fraternity or sorority houses than among those who lived in residence halls. Among students living in residence halls, those in substance-free living arrangements experienced fewer secondhand effects than those living in residences where smoking and alcohol use were not explicitly restricted. In 2001, 8 in 10 (83%) of the inhabitants of fraternity or sorority houses and 7 in 10 (67%) of the students who lived in non-substance-free residences experienced at least 2 or more secondhand effects, compared with 6 in 10 (58%) of students who lived in substance-free residence halls. This pattern was consistent over the survey years.

Drinking Venues

Data for select drinking venues across each of the 4 survey years are shown in Table 8. Student attendance at residence hall events or parties did not change over the study period. The rate of heavy drinking increased at these venues, although most of the change occurred between 1993 and 1997. Attendance and heavy drinking at fraternity and sorority house parties each significantly decreased between 1993 and 2001. At the same time, we found an increase in both attendance and heavy drinking at off-campus parties. Although the prevalence of students who went to off-campus bars decreased between 1993 and 2001, the rate of drinking 5 or more drinks in the bars was higher in 2001 than in 1993.

Trends in Experience of Prevention Efforts

Students were more likely to report being exposed to alcohol education programs differing in both format and content in 2001 compared with 1993. They reported that they were more likely to attend lectures, meetings or workshops, and special college courses in 2001 than in 1993, but they were less likely to see educational posters, signs, announcements, or articles.

A significantly increased proportion of students reported receiving all types of information from the colleges between 1993 and 2001 (Table 9). Nationally, more than half of all students reported that their school provided them with information about college rules governing alcohol use, the penalties for breaking those rules, and where to get help for alcohol-related problems. We noted slight increases in the percentages of students exposed to this information over the 4 CAS studies. In 1993, only about 1 in 3 students reported that their school gave them information about how to recognize a problem drinker, the long-term health effects of heavy alcohol use, and the dangers of alcohol overdose. We observed significant and substantial increases in the percentages of students who reported that they were provided with this information across the 4 surveys, and more than half of all students reported that their school told them about the dangers of alcohol overdose. Further examination suggested that those students who were binge drinkers or had demographic characteristics that placed them at greater risk for being binge drinkers were provided with this information.

Students reported that colleges took stronger action to

TABLE 8
Attendance and Heavy Drinking at Select On-Campus and Off-Campus Venues

Venue	% prevalence in each survey				Change over time		
	1993 ^a	1997 ^b	1999 ^c	2001 ^d	2001 vs 1993		Test for linear time trend <i>p</i>
					OR	95% CI	
Dorm event or party							
% attending	29.1	32.2	30.3	29.2	1.01	0.91, 1.11	.5836
% consuming ≥ 5 drinks	4.4	9.6	7.3	6.2	1.43	1.16, 1.76***	.0002
Fraternity/sorority party							
% attending	39.5	33.4	32.6	32.4	0.73	0.67, 0.80***	< .0001
% consuming ≥ 5 drinks	14.7	15.4	13.9	12.5	0.82	0.74, 0.91***	.0012
Off-campus party							
% attending	66.7	69.4	72.5	72.0	1.28	1.17, 1.41***	< .0001
% consuming ≥ 5 drinks	23.9	29.1	29.9	30.3	1.38	1.26, 1.51***	< .0001
Off-campus bar							
% attending	73.3	68.9	70.8	70.5	0.87	0.80, 0.95**	.0012
% consuming ≥ 5 drinks	22.6	23.2	23.9	32.5	1.65	1.49, 1.83***	< .0001

Note. Percentage is based on the total students in the survey who drank alcohol in the past 30 days. OR = odds ratio; CI = confidence interval.

^a*n* = 10,671. ^b*n* = 9,447. ^c*n* = 8,875. ^d*n* = 7,364.

p* < .01; *p* < .001.

TABLE 9
Exposure to Educational Materials

Educational material	% prevalence in each survey				Change over time		
	1993 ^a	1997 ^b	1999 ^c	2001 ^d	2001 vs 1993		Test for linear time trend <i>p</i>
					OR	95% CI	
Direct educational programs							
Lectures, meetings, or workshops	14.7	16.9	18.8	17.9	1.27	1.14, 1.41***	< .0001
Special college course	6.4	7.8	9.0	8.7	1.39	1.20, 1.60***	< .0001
Indirect educational programs							
Mailings or handouts	34.2	34.3	35.5	33.0	0.95	0.85, 1.06	.8663
Posters or signs	67.6	65.5	67.4	63.6	0.84	0.75, 0.94**	.0253
Announcement or articles	57.2	55.0	57.9	53.6	0.86	0.77, 0.97*	.1281

Note. OR = odds ratio; CI = confidence interval.

^a*n* = 15,282. ^b*n* = 14,428. ^c*n* = 13,954. ^d*n* = 10,904.

p* < .05; *p* < .01; ****p* < .001.

address heavy drinking in 2001 than in 1993 for drinkers and separately for frequent binge drinkers. In an analysis limited to students who drank alcohol in the past year, students reported increases between 1993 and 2001 in 5 selected consequences imposed by college authorities. These potential consequences included being fined, attending a required educational program, performing community service, being referred to a treatment program, and receiving other disciplinary action. In contrast, the

percentage of students who reported that they had received a warning did not significantly change. In 2001, 5% of students who drank alcohol in the past year experienced at least 1 of the 5 consequences, whereas 4% did so in 1993. We noted a similar pattern, with minor exceptions, when we considered frequent binge drinkers only. Reports of receiving a warning decreased, but reports of receiving other disciplinary action did not change. Despite these increases in

various disciplinary actions, the overall percentage of students who experienced these imposed consequences for their drinking in 2001 remained small (summarized in Table 10).

Student reports of the consequences imposed by a college for student drinking at residence hall or campus events also changed between 1993 and 2001. Students who lived in residence halls were less likely to be searched for alcohol when entering a residence hall (3.9% in 2001 and 6.0% in 1993; OR = 0.64; 95% CI = 0.46–0.88; $p < .0001$). In 2001, students who attended any on-campus events were more likely to be at a campus party that was shut down because of alcohol (26.6% in 2001 and 22.3% in 1993; OR = 1.26; 95% CI = 1.10–1.44; $p = .0002$).

Changes in Views of Alcohol-Control Policies

In 2001, a majority of students supported a selected set of potential alcohol-control actions or policies that a college could enact. The most popular suggestions were clarifying the alcohol rules (93%), providing more alcohol-free recreational and cultural opportunities (89%), and offering more

alcohol-free residences (89%). Policies such as holding hosts responsible for problems from alcohol use (55%), banning alcohol advertisements on campus (55%), cracking down on drinking at sororities and fraternities (56%), prohibiting kegs on campus (60%), and enforcing rules more strictly (63%) were also supported by a majority of students nationally. Among these, support for prohibiting kegs on campus (OR = 1.14; 95% CI = 1.06–1.26; $p < .001$), offering alcohol-free residence halls (OR = 1.72; 95% CI = 1.52–1.94; $p < .001$), and banning alcohol advertisement on-campus (OR = 1.29; 95% CI = 1.22–1.38; $p < .001$) increased significantly between 1993 and 2001. Meanwhile, student support for providing more alcohol-free recreational and cultural opportunities (OR = 0.46; 95% CI = 0.41–0.52; $p < .001$), enforcing rules more strictly (OR = 0.76; 95% CI = 0.72–0.81; $p < .001$), and clarifying the alcohol rules (OR = 0.67; 95% CI = 0.58–0.76; $p < .001$) significantly decreased over the same period. Although the views of some policies increased and some decreased or stayed the same, more than half of the students supported each of these alcohol-control policies.

TABLE 10
Exposure to Imposed Consequences for Drinking

Consequence	Prevalence in %				Change over time		
	1993 ^a	1997 ^b	1999 ^c	2001 ^d	2001 vs 1993 OR	95% CI	Test for linear time trend p
Received warning							
Total	6.5	5.5	6.1	6.0	0.93	0.78, 1.11	.4477
Frequent binge	12.7	12.9	10.7	10.2	0.78	0.63, 0.95*	.0045
Was fined							
Total	1.3	1.1	2.9	3.4	2.73	1.96, 3.81***	< .0001
Frequent binge	2.7	2.3	4.2	5.3	1.98	1.23, 3.19**	.0024
Was required to attend an alcohol education program							
Total	1.8	1.8	3.1	3.5	2.03	1.53, 2.70***	< .0001
Frequent binge	3.5	4.6	4.3	5.7	1.65	1.16, 2.35**	.0125
Had to perform community service							
Total	1.0	1.0	2.2	2.5	2.57	1.76, 3.74***	< .0001
Frequent binge	2.2	2.1	2.1	3.5	1.67	1.09, 2.56*	.0449
Was referred to an alcohol treatment program							
Total	0.5	0.6	1.8	2.2	4.70	3.15, 7.02***	< .0001
Frequent binge	1.1	1.5	1.2	2.5	2.27	1.28, 4.03**	.0128
Received other disciplinary action							
Total	1.8	2.1	2.9	3.0	1.71	1.31, 2.23***	< .0001
Frequent binge	4.1	4.6	3.8	4.3	1.04	0.73, 1.48	.9208
Any 1 of above†							
Total	4.0	3.9	5.1	5.1	1.30	1.09, 1.56***	< .0001
Frequent binge	8.7	9.2	8.6	9.2	1.07	0.84, 1.36	.7063

Note. Analysis limited to only those who drank alcohol within the past year. OR = odds ratio; CI = confidence interval.

†Receiving a warning was excluded from the measure.

^a $n = 12,708$. ^b $n = 11,506$. ^c $n = 10,825$. ^d $n = 8,783$.

* $p < .05$; ** $p < .01$; *** $p < .001$.

Peer Intervention in Others' Alcohol Use

In 2001, 35% of non-binge drinkers asked someone to stop drinking, whereas 32% did so in 1993 (OR = 1.12; 95% CI = 1.02–1.24; $p = .0169$). Students reported that they complained to a college official or resident advisor about the behavior of intoxicated students in 2001 at the same rate as they did in 1993.

Changes in Self-Recognition of Drinking Problems

In 2001, 4.2% of students who drank alcohol in the past year described themselves as heavy or problem drinkers, 13% had ever thought they had a drinking problem, and 3% received counseling or treatment for an alcohol-related problem. These rates did not differ from those in 1993. The proportion of students who sought help because of alcohol problems significantly decreased from 2.4% in 1993 to 1.5% in 2001 (OR = 0.62; 95% CI = 0.48–0.81; $p < .0001$). When we considered data on only frequent binge drinkers in 2001, 14% described themselves as heavy or problem drinkers, 23% thought they had ever had a drinking problem, 2% had ever sought help, and 7% received counseling or treatment for an alcohol-related problem. These rates did not differ from those in 1993.

COMMENT

A Cautionary Note About Student Surveys

The data presented in the current report should be interpreted with caution. Responses to the CAS survey are self-reports to a mail questionnaire. As such, they are subject to sources of error associated with this approach, including intentional or unintentional response distortion and sample attrition or failure to respond. Self-reports of alcohol use are considered to be reliable and valid.^{29–31}

The response rate for the CAS has declined since the initial survey in 1993, and this decline may affect the results of the current survey. It is difficult to predict the direction of the potential bias that this increasing trend of nonresponse may have produced. To protect against nonresponse bias, we instituted several statistical controls and found no association between student responses and binge-drinking rates. We found no difference in the response rates of early and late responders to the survey, and between responders and a sample of nonresponders who were sent a short version of the questionnaire. The rate of binge drinking found in this study was the same as that obtained by other major national surveys of college students. Moreover, the rate of binge drinking across the 4 survey years has remained remarkably consistent, and efforts to examine the influence of response rate statistically have revealed little effect. The same type of students and colleges exhibit similar binge-drinking rates each survey year. As a further precaution, we used a weighting procedure in the current study to correct for potential differences in response among demographic subgroups in the sample.

The CAS is a national study with a very large sample size, and the present analysis contains a large number of sta-

tistical tests. Some statistically significant differences may be observed by chance alone. To protect against this potential problem, we concentrated on statistical significance at only the .01 level and beyond, and we focused our discussion on patterns of results. We also considered the magnitude of difference in our discussion of the findings.

Findings and Conclusions

The 2001 rates of binge drinking at the 119 CAS colleges were remarkably similar to those found at the same institutions in 1993, 1997, and 1999.^{1,12,22} Nationally, 2 of 5 undergraduate college students were binge drinkers, a rate that has not changed since 1993. When we examined changes across the survey years at individual schools, we found significant drops in the overall rate of binge drinking at only a few colleges and significant increases at an equally small number. No pattern emerged that could account for these changes, and the findings may have simply occurred by chance.

We also found that the polarization of drinking behaviors on campus, first reported in 1997,²² has continued. In 2001, a higher percentage of college students than in 1993 reported that they abstained from alcohol. At the same time, a higher percentage of students engaged in frequent binge drinking. We found that in 2001 more drinkers could be viewed as drinking to excess on such measures as frequency of drinking, frequency of drunkenness, and frequency of drinking to get drunk, which is consistent with the finding that more students are frequent binge drinkers. This higher level of immoderate consumption probably accounts for the increase in the reported amount of self-induced harm drinkers caused over the study period.

At the same time, non-binge drinkers who live on campus were not experiencing an increased level of secondhand effects of alcohol. Previous findings from the CAS survey data noted a strong relationship between the rate of binge drinking and the experience of secondhand effects among non-binge drinkers.²⁰ A closer examination revealed that although there were few changes in the rates of secondhand effects among those who lived in substance-free housing and among residents of non-substance-free housing, the number of students living in substance-free housing nationally increased significantly. Because substance-free housing helps protect students from experiencing secondhand effects,³² placing more students in such settings might have helped keep the overall rate from rising at a time when frequent binge drinking was increasing nationally. Substance-free residence halls represent one promising strategy for reducing problems with alcohol because these residences offer some protection from the secondhand effects of others' drinking and might protect those who did not binge drink in high school from binge drinking in college.

It is interesting that the overall rise in frequent binge drinking occurred simultaneously with a decrease in high school binge-drinking rates reported by these students. In our previous studies, we found a strong relationship between high school and college binge drinking³³ and a

lowered likelihood of binge drinking in college if high school non-*binge* drinkers were housed in substance-free living quarters.³² An increase in the use of such residences and a decrease in high school binge drinking should result in lowered college binge-drinking rates. That it did not do so suggests that other factors are keeping overall binge-drinking rates in college at these high levels.

Although the overall binge-drinking rates have not changed, there have been shifts in drinking behavior among some subgroups. In 1993, students attending all-women's colleges had much lower rates of binge drinking, and attendance at these schools seemed to protect women from a heavy-drinking lifestyle.³³ Since that time, students at these schools have reported significant increases in frequent binge drinking, and they are now narrowing the gap in drinking behavior between all-women's colleges and coeducational schools. We also noted increases in binge-drinking rates among students living off campus with a spouse, which rose from 19% in 1993 to 27% in 2001.

The profile of college students is changing rapidly. More women, more part-time, and more non-traditional-age students as well as more students of color are attending college³⁴; these students tend to be at the lowest risk for engaging in binge drinking.³³ However, the majority of college students continue to be those who are aged 18 to 23 years, have never married, and live independently of their parents. In the 2001 sample, we closely examined the drinking behavior of these traditional college students and found high rates of binge drinking. In this group, 51.5% were binge drinkers (55.5% of the male students; 48.0% of the female students).

Among subgroups of students within this group of traditional college students, 60.5% of White men and 54.3% of White women were binge drinkers, as were 75.1% of fraternity members, 62.4% of sorority members, 63% of male athletes, and 52.5% of female athletes. Among traditional college students who drank any alcohol in the past 30 days, 70.3% were binge drinkers (67.3% of the women and 73.6% of the men). The high rate of binge drinking among these core groups of college students indicated that heavy drinking is normative behavior among typical college students.

There is also some good news from the 2001 findings. Fewer residents of fraternity and sorority houses engaged in binge drinking over the 4 studies. Although the rates for this student group remained very high, our findings may reflect concerted efforts on some campuses to address the most extreme drinking behavior by suspending offenders or instituting alcohol bans at some chapters. The same downward trend was not noted for all members of fraternities and sororities, although the percentage of students who were members of these organizations was significantly smaller in 2001 than it had been in the earlier studies. Significant declines in binge drinking were also noted for Hispanic and Native American students.

Additional positive indicators of change regarding drinking on college campuses include the following:

- An increase in reports of students asking other students to cut back or stop using alcohol.
- An increase in the numbers of students in 2001 who reported support for some strong alcohol policies, including prohibiting kegs, banning advertisements, and offering alcohol-free residences; a majority of students nationally supported these policies.

The increase in awareness of heavy alcohol use as a major problem among college students, which may be contributing to these findings. College students may be well ahead of college administrators in supporting tougher measures to deal with this campus problem.

The lack of change in binge drinking among college students since 1993 is notable, given the significant efforts to combat this problem. The 2001 CAS found that more students nationally reported that they were exposed to educational materials about the risks and consequences of drinking that their schools provided. A majority of students reported that they were apprised of their school's rules regarding alcohol, the penalties for noncompliance, where they could get help for alcohol-related problems, and the dangers of alcohol overdose. In addition, student experiences of strong enforcement efforts have begun to increase. Although the numbers are still relatively small, more students reported being fined, referred for alcohol education, required to perform community service, and being subjected to other disciplinary actions. Overall, the reports of these sanctions remained quite low, with fewer than 10% of frequent binge drinkers experiencing any disciplinary action as the result of their drinking.

It appears that these efforts were not sufficient in intensity or extent to be accompanied by a change in binge-drinking levels. For prevention efforts to be successful, schools and communities must go beyond "one-size-fits-all" approaches.^{1,14,35} Heavy drinking behavior differs according to many personal and environmental characteristics, including gender; age; year in school; place of residence; location of school; interest in athletics or social activities; membership in a Greek-letter organization; and local, state, and federal policies affecting students. These results strongly suggest that segmenting and tailoring efforts to specific populations are important for successful prevention.

Past prevention efforts have largely emphasized changing characteristics of individual drinkers, such as their knowledge, attitudes, and perceptions.^{1,13} Prevention efforts must extend beyond these familiar approaches or use them strategically to effect change in other areas.³⁶ Data from a variety of sources suggest efforts that could be made to influence an environment that aggressively promotes alcohol use to college students and ensures that it is easily accessible to them.

Recently, a panel of experts convened by the Substance Abuse and Mental Health Services Administration (SAMHSA) examined and summarized the literature dealing with environmental approaches to alcohol abuse.³⁷ This panel found that environmental interventions were feasible and effective. In their report, they identified several evidence-

based intervention areas that can help reduce alcohol consumption and related problems, including the following strategies:

- Decreasing the availability of alcohol to underage drinkers
- Raising alcohol taxes and prices
- Instituting responsible beverage service
- Changing the conditions of availability by limiting outlets
- Changing hours of service and days of sales

These findings are in line with results from earlier CAS research that has indicated that binge-drinking levels are associated with ease of access to alcohol, price, special promotions, and outlet density in college communities.^{21,38,39} They are also consistent with more recent work on the impact of access to alcohol on injury and other negative health outcomes.^{40,41} Community-based efforts to address these areas have been rigorously evaluated and have demonstrated success in reducing both consumption of alcohol and associated harms.^{37,42} These are promising approaches for a college setting.^{43,44}

Addressing environmental prevention will require that colleges work as partners with other agencies and organizations in the community, such as state and local lawmakers, regulatory agencies, public and private service providers, and businesses. Unfortunately, activism in these areas often falls outside the comfort level and expertise of traditional college alcohol-prevention staff members. Given the unchanged nature of heavy drinking among college students and the serious health and social effects that result, the time has come for more campuses and communities to try new and comprehensive approaches.

ACKNOWLEDGMENTS

This study was supported by a grant from the Robert Wood Johnson Foundation. We gratefully acknowledge the assistance of the Center for Survey Research of the University of Massachusetts-Boston, Dr Anthony M. Roman for conducting the mail survey, Jeff Hansen for the preparation of the data, and Lisa Travis for technical assistance.

NOTE

For further information, please address communications to Henry Wechsler, PhD, Harvard School of Public Health, Department of Health and Social Behavior, 677 Huntington Avenue, Boston, MA 02115 (E-mail: hwechsle@hsph.harvard.edu).

REFERENCES

1. Wechsler H, Davenport A, Dowdall G, Moeykens B, Castillo S. Health and behavioral consequences of binge drinking in college: A national survey of students at 140 campuses. *JAMA*. 1994;272(21):1672-1677.
2. Wechsler H, Nelson TF. Binge drinking and the American college student: What's five drinks? *Psychol Addict Behav*. 2001;15:287-291.
3. *Behavioral Risk Factor Surveillance System online prevalence data*. Division of Adult and Community Health, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention (1995-1999). Available at: <http://www.cdc.gov/nccdphp/brfss>. Accessed December 6, 2001.
4. Higher Education Act Reauthorization of 1998, HR 321, 105th Cong (1997).
5. Higher Education Act Reauthorization of 1998, S 192, 105th Cong (1998).
6. *Healthy People 2010: Understanding and Improving Health and Objectives for Improving Health*. 2nd ed. Vol. 2, Goal 26-11: Reduce the proportion of persons engaging in binge drinking of alcoholic beverages. Washington, DC: US Government Printing Office; 2000.
7. *National Advisory Council on Alcohol Abuse and Alcoholism Subcommittee on College Drinking*, National Institute on Alcohol Abuse and Alcoholism; 1998. Available at: <http://www.niaaa.nih.gov/about/college/default.htm>. Accessed September 28, 2001.
8. *Declaration on Young People and Alcohol*. World Health Organization. Presented at the World Health Organization European Ministerial Conference on Young People and Alcohol, Stockholm; 2001.
9. *College Commission to Address Alcohol's Impact on America's College Campuses*. Mothers Against Drunk Driving. 2001. Available at: http://www.madd.org/Programs/college_commission_report.pdf. Accessed March 1, 2001.
10. *A matter of degree: The national effort to reduce high-risk drinking among college students*. Robert Wood Johnson Foundation; 1996. Available at: http://www.rwjf.org/app/rw_about_our_grantees/rw_gra_main_set.html. Accessed December 16, 1996.
11. National Association of State Universities and Land-Grant Colleges 2000. <http://www.nasulgc.org/initiatives/alcohol.htm>. Accessed October 27, 2000.
12. Wechsler H, Lee J, Kuo M, Lee H. College binge drinking in the 1990s: A continuing problem. Results of the Harvard School of Public Health 1999 College Alcohol Study. *J Am Coll Health*. 2000;48:199-210.
13. Wechsler H, Kelly K, Weitzman E, SanGiovanni JP, Seibring M. What colleges are doing about binge drinking: A survey of college presidents. *J Am Coll Health*. 2000;48:219-226.
14. Wechsler H, Weitzman ER. Community solutions to community problems: Preventing adolescent alcohol use. *Am J Public Health*. 1996;86(7):923-924.
15. Dowdall GW, Wechsler H. Studying college alcohol use: Widening the lens, sharpening the focus. *J Stud Alcohol*. In press.
16. Johnston LD, O'Malley PM, Bachman JG. *Monitoring the Future national survey results on drug use, 1975-2000. Vol 2: College students and young adults ages 19-40* (NIH Publication 01-4925). Bethesda, MD: National Institute on Drug Abuse; 2001.
17. CDC. Youth risk behavior surveillance: National College Health Risk Behavior Survey United States. *MMWR*. 1997;46(SS-6):1-54.
18. Knight JR, Wechsler H, Kuo M, Seibring M, Weitzman ER, Schuckit MA. Alcohol abuse and dependence among US college students. *J Stud Alcohol*. In press.
19. *Diagnostic and Statistical Manual of Mental Disorders*, Fourth Edition, Washington DC: American Psychiatric Association; 1994.
20. Wechsler H, Moeykens B, Davenport A, Castillo S, Hansen J. The adverse impact of heavy episodic drinkers on other college students. *J Stud Alcohol*. 1995;56:628-634.
21. Wechsler H, Lee JE, Hall J, Wagenaar AC, Lee H. Second-hand effects of student alcohol use reported by neighbors of colleges: The role of alcohol outlets. *Soc Sci Med*. In press.
22. Wechsler H, Dowdall GW, Maenner G, Gledhill-Hoyt J, Lee H. Changes in binge drinking and related problems among American college students between 1993 and 1997. *J Am Coll Health*. 1998;47:57-68.
23. Enrollment in postsecondary institutions, 1997. US Dept of Education, Office of Educational Research and Improvement. Available at: <http://nces.ed.gov/pubs2000/2000160.pdf>. Accessed January 25, 2002.

24. Wechsler H, Austin SB. Binge drinking: The five/four measure. *J Stud Alcohol*. 1998;59(1):122–124.
25. Wechsler H, Dowdall G, Davenport A, Rimm E. A gender-specific measure of binge drinking among college students. *Am J Public Health*. 1995;85:982–985.
26. Zeger SL, Liang KY, Albert PS. Models for longitudinal data: A generalized estimating equation approach. *Biometrics*. 1988;44:1049–1060.
27. Liang KY, Zeger SL. Longitudinal data analysis using generalized linear models. *Biometrics*. 1992;73:12–22.
28. SAS/STAT *User's Guide, Version 6. 4th ed.* Cary, NC: SAS Institute, Inc; 1994.
29. Cooper AM, Sobell MB, Sobell LC, Maisto SA. Validity of alcoholics' self-reports: Duration data. *International Journal of Addiction*. 1981;16:401–406.
30. Midanik L. Validity of self report alcohol use: A literature review and assessment. *British Journal of Addiction*. 1988;83:1019–1030.
31. Frier MC, Bell RM, Ellickson PL. *Do teens tell the truth? The validity of self-report tobacco use by adolescents.* Santa Monica, CA: RAND; 1991. RAND publication N-3291-CHF.
32. Wechsler H, Lee JE, Nelson TF, Lee H. Drinking levels, alcohol problems, and secondhand effects in substance-free college residences: Results of a national study. *J Stud Alcohol*. 2001;62:23–31.
33. Wechsler H, Dowdall GW, Davenport A, Castillo S. Correlates of college student binge drinking. *Am J Public Health*. 1995;85:921–926.
34. Gerald DE, Hissler WJ. Projections of education statistics to 2011, US Dept of Education, National Center for Educational Statistics. NCES 2001–083. Washington, DC: 2001. Available at: <http://nces.ed.gov/pubs2001/proj01>. Accessed January 25, 2002.
35. Wechsler H, Nelson T, Weitzman E. From knowledge to action: How Harvard's College Alcohol Study can help your campus design a campaign against student alcohol abuse. *Change*. 2000;Jan/Feb:38–43.
36. Holder HD. Prevention of alcohol problems in the 21st century: Challenges and opportunities. *Am J Addict*. 2001;10(1):1–15.
37. *Preventing Problems Related to Alcohol Availability: Environmental Approaches.* Substance Abuse and Mental Health Services Administration, Center for Substance Abuse Prevention, Division of State and Community Systems Development, Department of Health and Human Services, Publication No. (SMA)99-3298. Available at: <http://www.health.org/govpubs/PHD822/aar.htm>. Accessed July 18, 2001.
38. Chaloupka FJ, Wechsler H. Binge drinking in college: The impact of price, availability, and alcohol control policies. *Contemporary Economic Policy*. 1996;14:112–124.
39. Wechsler H, Kuo M, Lee H, Dowdall G. Environmental correlates of underage alcohol use and related problems of college students. *Am J Prev Med*. 2000;19:24–29.
40. Gorman DM, Speer PW, Gruenewald PJ, Labouvie EW. Spatial dynamics of alcohol availability, neighborhood structure and violent crime. *J Stud Alcohol*. 2001;62(5):628–36.
41. Treno AJ, Gruenewald PJ, Johnson FW. Alcohol availability and injury: The role of local outlet densities. *Alcohol Clin Exp Res*. 2001;25(10):1467–1471.
42. Holder HD, Gruenewald PJ, Ponicki WR, et al. Effect of community-based interventions on high-risk drinking and alcohol-related injuries. *JAMA*. 2000;284(18):2341–2347.
43. Kuh GD. The influence of college environments on student drinking. In: Gonzalez G, Clement V, eds. *Research and Intervention: Preventing Substance Abuse in Higher Education.* Washington, DC: Office of Educational Research and Improvement; 45–71.
44. Hingson R, Howland J. Comprehensive community interventions to promote health implications for college age drinking problems. *J Stud Alcohol*. In press.