

College Binge Drinking in the 1990s: A Continuing Problem

Results of the Harvard School of Public Health 1999 College Alcohol Study

Henry Wechsler, PhD; Jae Eun Lee, DrPH; Meichun Kuo, ScD; Hang Lee, PhD

Abstract. In 1999, the Harvard School of Public Health College Alcohol Study resurveyed colleges that participated in the 1993 and 1997 surveys. Responses to mail questionnaires from more than 14 000 students at 119 nationally representative 4-year colleges in 39 states were compared with responses received in 1997 and 1993. Two of 5 students (44%) were binge drinkers in 1999, the same rate as in 1993. However, both abstention and frequent binge-drinking rates increased significantly. In 1999, 19% were abstainers, and 23% were frequent binge drinkers. As before, binge drinkers, and particularly frequent binge drinkers, were more likely than other students to experience alcohol-related problems. At colleges with high binge-drinking rates, students who did not binge drink continued to be at higher risk of encountering the secondhand effects of others' heavy drinking. The continuing high level of binge drinking is discussed in the context of the heightened attention and increased actions at colleges. Although it may take more time for interventions to take effect, the actions college health providers have undertaken thus far may not be a sufficient response.

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

In 1993, the Harvard School of Public Health College Alcohol Study (CAS) surveyed a random sample of students at 140 colleges in 39 states and the District of Columbia. The survey constituted the first attempt to study drinking patterns in a nationally representative sample of college students. The findings, first published in December 1994,¹ received widespread national attention.

The study's authors described a style of drinking that

they designated as "binge" drinking, defined as the consumption of five or more drinks in a row for men and four or more for women, at least once in the 2 weeks preceding the survey. The term *binge drinking* was used by Wechsler and colleagues several years before in a study of Massachusetts college students' alcohol use.² The term is now used in the media as a catchword to designate college drinking that leads to serious problems. Following the publication of the initial CAS results, there was greater media attention to alcohol-related tragedies among college students, including deaths in a variety of circumstances: acute alcohol poisonings, falls, drownings, automobile collisions, fires, and hypothermia resulting from exposure. Such drastic consequences underscore the multitude of other, less severe, outcomes of binge drinking.

Heightened public interest in binge drinking prompted changes in the way colleges addressed the problem. Until the mid-1990s, student drinking issues were largely the responsibility of alcohol educators and deans of students. Since then, in association with extensive media coverage and the release of several national studies of drinking behavior, college presidents are often involved. Many of them are frequently included in statewide and regional coalitions that address the problem jointly.

Other indications that college alcohol issues have been placed on the national agenda are such developments as passage of a resolution by the US House of Representatives and the Senate to address binge drinking; a National Institute on Alcoholism and Alcohol Abuse special task force on college drinking, as well as a special grant program to focus on this issue; a Centers for Disease Control and Prevention (CDC) health risk survey for college students; and frequent features on binge drinking in major television network news magazine programs. The Robert Wood Johnson Foundation has established an initiative, the Matter of Degree program,

Henry Wechsler, Jae Eun Lee, and Meichun Kuo are all with the Department of Health and Social Behavior at the Harvard School of Public Health in Boston, and Hang Lee is with the Center for Vaccine Research and Department of Pediatrics at the University of California Los Angeles School of Medicine in Torrance.

which provides funding to universities to develop comprehensive environmental-change approaches by establishing college/community coalitions to address the problem of student drinking.

In 1997, the CAS survey of students was repeated at the original colleges with new samples. That survey found little change in the intervening 4 years in the overall rates of binge drinking. For the 116 colleges in that analysis, a minor drop occurred in the proportion of binge drinkers, from 44.1% in 1993 to 42.7% in 1997. However, the study uncovered an increase in the prevalence of both frequent binge drinking and abstention. A polarization effect was observed, resulting in two sizable groups of students on campus: those who did not drink at all (19%) and those who binge drank three or more times in a 2-week period (21%). Students in the latter group of frequent binge drinkers were found to consume a median of 14.5 drinks per week, and this group accounted for 68% of all the alcohol consumed by college students.³

Despite all of the attention focused on binge drinking by colleges and the media and the initial actions to reduce alcohol-related problems, little change in student drinking levels occurred on the national level between 1993 and 1997. The CAS was repeated in 1999 to examine overall levels of binge drinking and to determine whether the trend toward increased polarization of drinking behavior on campus had continued.

METHOD

Sample of Colleges

In 1999, we resurveyed 128 schools from the original list of 140 colleges that were surveyed in 1993 and the 130 colleges surveyed in 1997. The 128 schools were located in 39 states and the District of Columbia. The original 1993 sample was selected from a list of accredited 4-year colleges provided by the American Council on Education. The sample was selected using probability sampling proportionate to the size of undergraduate enrollment at each institution. In 1999, we obtained student samples using the same procedures we had used in the first two surveys. Details of the sample and research design of the 1993 and 1997 surveys are described elsewhere.^{1,4}

In 1999, as in the previous surveys, we asked administrators at each college to provide a random sample of 225 undergraduates drawn from the total enrollment of full-time students. The attrition of 10 colleges in 1997 and 2 colleges in 1999 was primarily the result of the college administrators' inability to provide a random sample of students and their mailing addresses to us within the time requirements for the study.

In conducting the data analyses, we excluded schools that failed to meet the minimal criteria for response rate. To be part of the 3-year comparison sample described in this report, a school had to have a response rate of at least 50% in two of the three surveys and a rate of at least 40% in the third. For all 3 survey years, 119 schools met these criteria, and we dropped 9 from the analyses. When we compared

the binge-drinking rates of the 119 retained in 1999 with the corresponding rates of all 128 participating in 1999, we found that they were identical. Dropping the low-response schools did not change the results of the survey. Similar comparisons for the 1997 and 1993 rates of these schools with those of the total samples in those years also revealed no differences.

The sample of 119 colleges presents a national cross-section of 4-year colleges. Two thirds of the colleges sampled are public institutions, and one third are private. In terms of student enrollments, two fifths of the schools (44%) are large (more than 10 000 students), one fifth (23%) are medium sized (5001 to 10 000 students), and nearly one third (34%) are small (5000 students or fewer). About two thirds are located in an urban or suburban setting and one third are in small-town or rural settings. Fifteen percent are affiliated with a religious denomination, and 5% enroll women only.

Questionnaire

The 1999 survey repeated standard questions used in 1993 and 1997 about alcohol, tobacco, and other drug use, as well as lifestyle, demographic, and other background characteristics. These questions were adapted from previous large-scale, national studies.^{2,5,6} 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 of liquor (1.25 oz or 37 mL), either straight or in a mixed drink. Questions also inquired about students' experiences with prevention programs and school alcohol and tobacco policies.

The Measure of Binge Drinking

Heavy episodic or binge drinking was defined as the consumption of at least five drinks in a row for men or four drinks in a row for women during the 2 weeks before the completion of the questionnaire. In the past decade, large-scale epidemiologic studies of youth alcohol use have employed five drinks in a row as a measure of heavy drinking, and this has become a standard measure in both secondary school populations [the University of Michigan's National Institute of Drug Abuse (NIDA)-sponsored Monitoring the Future study⁵] and college populations (Core Institute Survey,⁷ National College Health Risk Behavior Survey⁸). In an analysis of the 1993 CAS data,⁹ a gender-specific definition ("five/four") of binge drinking provided a measure of equivalent alcohol-related problems for college men and women.

The CAS gender-specific measure of binge drinking was constructed from responses to four questions: (a) gender; (b) recency of last drink; (c) drinking five or more drinks during the past 2 weeks; and (d) drinking four or more drinks during the past 2 weeks. Missing data for any of these questions resulted in the exclusion of that student's responses from the analysis of binge drinking. We excluded 2.6% of the responses in 1993, 1.4% in 1997, and 2.3% in 1999.

We defined *frequent binge drinkers* as those students who

had binged three or more times in the past 2 weeks (or more than once a week, on average), *occasional binge drinkers* were those students who had binged one or two times in the same period. *Nonbinge drinkers* were those students who had consumed alcohol in the past year but had not binged in the previous 2 weeks, and *abstainers* were those students who had consumed no alcohol in the past year.

Students who had consumed alcohol in the past 30 days were asked to report on the number of occasions they had a drink of alcohol in the past month. The 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. In response to a question asking whether getting drunk was a reason for drinking, students who responded *very important*, *important*, or *somewhat important*, as opposed to *not important*, were considered to have the drinking style of "drinking to get drunk." High school binge drinking was defined as *the amount of alcohol usually consumed during the last year of high school*, using the same five/four measure.

Students who drank alcohol in the past year were asked a series of questions about their experiences with alcohol-related problems during the current school year, including 12 health and behavioral consequences of one's own drinking. All students were asked 8 questions about the consequences of other students' drinking (secondhand effects). We examined these secondhand effects among students who were not binge drinkers (nonbinge drinkers and abstainers) and lived on campus (ie, were residents of on-campus dormitories or fraternity/sorority houses).

In this article, data on alcohol-related sexual assaults and unwanted sexual advances, problems that most frequently affect women, are presented for women only. We divided colleges into high-binge institutions (more than 50% of students are binge drinkers); middle-binge 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

In all three surveys, questionnaires were mailed directly to students at the end of February. Three separate mailings were sent within a 3-week period: first a questionnaire, then a reminder postcard, followed by a second questionnaire. Mailings were timed to avoid the period immediately preceding and following spring break so that students would be responding to questions concerning their behavior during a time when they were on campus. The students' responses were voluntary and anonymous. The study therefore received exempt status from the institutional review committees. To encourage students to respond, we offered an award of one \$1,000 prize to a student whose name was drawn from among students responding within 1 week; a \$500 award and 10 \$100 awards were offered to students whose names were drawn from a pool of all who responded.

Response rates varied among the colleges that participated in the 1993, 1997, and 1999 surveys. Average response rates were 60% in 1999 (range = 49%–83%), 60% in 1997

(range = 40%–88%), and 70% in 1993 (range = 41%–100%).

We used two procedures to examine potential bias introduced by nonresponders. The response rates at individual colleges were not associated with their binge-drinking rates. The Pearson correlation coefficient between a college's binge rate and its response rate was $-.029$ ($p = .753$) in 1999, $.006$ ($p = .949$) in 1997, and $-.014$ ($p = .879$) in 1993. In addition, we adjusted for response rates in the multiple logistic regression models in all of the analyses.

Data Analysis

We used chi-square analysis to compare student characteristics and outcomes of interest between the 3 survey years. Prevalence of outcomes over the 3 survey years was indicated by percentages and their percentage changes, and tested for significance, using the chi-square test. We employed logistic regression to assess the odds of an alcohol-related problem or behavior for binge drinkers compared with nonbinge drinkers. In this article, we report adjusted odds ratios (ORs) and 95% confidence intervals for student and college characteristics, based on the logistic regression model. In addition, we employed the generalized estimating equations (GEE)^{10,11} approach to fitting the logistic regression models. Because it uses the clustered outcomes appropriate to our sampling scheme, the GEE provides more robust standard errors of the OR estimates. The GEE procedure resulted in little or no difference in the estimated ORs, compared with the ordinary logistic regression models, and provided slightly greater standard errors of the estimate. When appropriate, we used the GEE-based standard errors to perform the significance tests. We also used this method in the time-trend analysis of frequent binge drinking and abstaining over the three surveys, adjusting for class year, sex, and race.

Four percent of the participants were sampled in both the 1997 and 1999 surveys. However, we found no statistical evidence of reduced variation in the sample resulting from these duplicated respondents, and therefore they remained in the analysis. To facilitate comparisons between the 1993, 1997, and 1999 data, we used data from only those respondents at the 119 schools that met the inclusion criteria for relatively high response rates in all survey years. Thus, the 1999 findings are slightly different (usually 1% or less) from those previously reported in articles reporting data for the 140 colleges in 1993¹ and the 116 colleges³ in 1997.

RESULTS

Composition of the Student Samples

In 1999, 3 of 5 (61%) respondents were women. This was higher than the national rates (55%) of undergraduate women at 4-year institutions.¹² Perhaps this was attributable, at least in part, to the inclusion of 6 women's colleges. Four of 5 (78%) of the respondents were White, and 15% were more than 23 years of age. The background characteristics of the students at the 119 colleges were similar to those found in 1993 and 1997. However, because each of

the three survey samples consisted of more than 14 000 students, even small differences were statistically significant (Table 1).

In 1999, the proportion of women in the CAS was higher than in 1993 and 1997, and the proportion of White and older students in 1999 was lower than in 1993 and 1997. Because both of these demographic characteristics were associated with drinking outcome, we controlled the multivariate comparisons of drinking and other behaviors in the three survey samples for those characteristics.

Student Drinking Behavior

Data on drinking patterns of students in the three surveys are presented in Table 2. In 1999, as in previous years, approximately 2 of 5 students' self-reported drinking behaviors met our criteria for binge drinking. The proportion of binge drinkers, therefore, did not change among most student subgroups between 1993 and 1999, with two notable exceptions. Binge drinking decreased among dormitory residents and increased among students living off campus (Table 3).

TABLE 1
General Characteristics of Student Samples, 1993, 1997, 1999

Characteristic	Sample			2		
	1993 (N = 15 403) %	1997 (N = 14 724) %	1999 (N = 14 138) %	'93 v '99 p	'93 v '97 p	'97 v '99 p
Gender						
Male	42.6	39.8	38.7	< .0001	< .0001	.0710
Female	57.4	60.2	61.3			
Ethnicity						
Hispanic	6.5	7.9	7.3	.0055	< .0001	.0396
Non-Hispanic	93.5	92.1	92.7			
White	82.7	78.9	78.0	< .0001	< .0001	.0021
Black/African American	4.8	5.1	5.9	.0001	.3214	.0042
Asian/Pacific Islander	6.5	7.6	8.3	< .0001	.0003	.0490
Native American Indian/Other	6	8.4	7.9	< .0001	< .0001	.0706
Age						
< 24 y	83.5	83.6	84.8	.0015	.8603	.0030
24 y	16.5	16.4	15.2			
Year in school						
Freshman	20.2	23.7	23.0	< .0001	< .0001	.2775
Sophomore	19.3	21.5	22.4	< .0001	< .0001	.0243
Junior	24.3	23.4	24.6	.8105	.0126	.0073
Senior	25.5	22.3	22.0	< .0001	< .0001	.2775
5th	10.8	9.1	8.1	< .0001	< .0001	.0044

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

Category	Prevalence (%)			Change (%)		
	1993 (N = 14 995)	1997 (N = 14 520)	1999 (N = 13 819)	'93 v '99	'93 v '97	'97 v '99
Abstainer (past y)	15.4	18.9	19.2	24.7***	22.6***	1.7
Nonbinge drinker†	40.1	38.2	36.6	-8.6***	-4.7***	-4.1**
Occasional binge drinker‡	24.7	22.0	21.4	-13.1***	-11.0***	-2.4
Frequent binge drinker§	19.8	20.9	22.7	14.5***	5.6*	8.5***

Note. Sample sizes vary from those in Table 1 because of missing values.

†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.

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

TABLE 3
Changes in Prevalence of Binge Drinking, 1993, 1997, 1999, by Student Characteristics

Characteristic	Prevalence (%)			Change (%)		
	1993 (N = 15 403)	1997 (N = 14 724)	1999 (N = 14 138)	'93 v '99	'93 v '97	'97 v '99
Total	44.5	42.9	44.1	-0.8	-3.6**	2.9*
Gender						
Male	50.7	48.3	50.7	0.0	-4.6*	4.8*
Female	39.9	39.3	40.0	0.3	-1.5	1.8
Ethnicity						
Hispanic	39.0	37.9	39.5	1.1	-2.8	4.1
Non-Hispanic	44.8	43.3	44.5	-0.7	-3.4*	2.8*
White	48.4	46.9	49.2	1.7	-3.1*	5.0**
Black/African American	15.7	19.1	15.5	-1.5	21.5	-18.9
Asian/Pacific Islander	22.1	25.3	23.1	4.5	14.7	-8.9
Other	38.8	37.4	39.6	2.1	-3.6	5.9
Age						
< 24 y	47.5	45.6	47.0	-1.2	-4.0**	2.9*
24 y	29.0	28.8	28.1	-2.9	-0.6	-2.4
Year in school						
Freshman	43.5	43.3	42.1	-3.3	-0.4	-3.0
Sophomore	45.7	43.8	44.5	-2.6	-4.2	1.6
Junior	44.7	44.5	45.9	2.8	-0.3	3.2
Senior	44.0	41.3	44.9	2.0	-6.1*	8.7**
5th	45.2	41.8	42.5	-5.9	-7.7	1.8
Residence						
Dormitory	47.3	45.3	44.5	-5.8**	-4.2*	-1.7
Fraternity/sorority house	83.1	81.6	78.9	-5.1	-1.9	-3.3
Off campus	41.1	40.2	43.7	6.2***	-2.3	8.7***
Fraternity/sorority member	67.4	65.5	64.7	-4.0	-2.8	-1.3
Binged in high school						
No	32.3	30.9	31.1	-3.8	-4.5*	0.7
Yes	69.7	70.7	73.9	6.0***	1.3	4.6***
Marital status						
Never married	47.5	45.7	46.9	-1.3	-3.7**	2.5
Married	20.5	18.7	18.3	-10.5	-8.9	-1.7

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

Even though the overall rate of binge drinking did not change between 1993 and 1999, other changes were evident. In 1999, drinking on college campuses continued a trend toward becoming more strongly polarized: almost 1 in 5 students (19%) was an abstainer, and almost 1 in 4 (23%) was a frequent binge drinker. The numbers of students in these two groups increased over the 3 survey years. To examine the 1993 to 1999 trends among abstainers and frequent binge drinkers, adjusting for year in class, race, and sex, we used the GEE. The result showed a significant increase in abstainers during the 4-year period from 1993 to 1997 (OR = 1.21, $p < .0001$) and no change (OR = 0.97, $p = .51$) during the 2-year period from 1997 to 1999. Overall, we observed a significant increase in the number of abstainers from 1993 to 1999 (OR = 1.18, $p < .0001$). The number of frequent binge drinkers significantly increased during the 4-year period, 1993 to 1997 (OR = 1.11, $p < .0126$), and continued to increase significantly during

the 2-year period, 1997 to 1999 (OR = 1.01, $p = .024$). Overall, we noted a significant increase in frequent binge drinkers from 1993 to 1999 (OR = 1.20, $p < .0001$).

When we took student characteristics into account, the rise in abstention and frequent binge drinking was significant between 1993 and 1999 in most student subgroups. The growth in abstention between 1993 and 1997 was significant in both men ($p < .001$) and women ($p < .001$). However, an increase in the numbers of women who abstained occurred in 1997, whereas the increase in men's abstaining was significant in both 1997 and 1999 ($p < .001$, see Table 4). A significant rise in abstention was reported among Hispanic ($p < .001$), African American ($p < .05$), Asian ($p < .05$), freshmen students ($p < .05$), and in residents of dormitories ($p < .001$) and fraternity/sorority houses ($p < .01$). In the meantime, a significant rise in frequent binge drinking occurred among students who were binge drinkers in high school.

TABLE 4
College Student Patterns of Alcohol Use, 1993, 1997, 1999, by Student Characteristics

Characteristic	Abstainers						Frequent bingers					
	Prevalence (%)			Change (%)			Prevalence (%)			Change (%)		
	1993	1997	1999	'93 v '99	'93 v '97	'97 v '99	1993	1997	1999	'93 v '99	'93 v '97	'97 v '99
Total	15.4	18.9	19.2	24.7***	22.6***	1.7	19.8	20.9	22.7	14.5***	5.6*	8.5
Gender												
Male	14.9	18.4	20.1	34.9***	24.0***	8.8*	22.8	23.8	26.0	13.7***	4.0	9.3**
Female	15.8	19.2	18.7	18.2***	21.5***	-2.7	17.5	19.0	20.6	17.4***	8.5*	8.2*
Ethnicity												
Hispanic	14.8	19.1	20.5	38.9***	29.4***	7.3	15.4	17.2	16.6	7.7	11.6	-3.4
Non-Hispanic	15.4	18.9	19.1	23.8***	22.2***	1.3	20.1	21.3	23.2	15.3***	5.7*	9.1***
White	13.1	16.1	15.6	19.2***	23.3***	-3.4	22.0	23.6	26.3	19.4***	7.1**	11.5***
Black/African American	32.6	35.3	38.0	16.6*	8.2	7.8	6.4	6.6	6.5	2.8	3.3	-0.5
Asian/Pacific Islander	32.1	33.2	36.7	14.1*	3.3	10.4	7.6	9.4	8.4	10.9	24.3	-10.9
Other	15.2	20.7	19.8	30.0**	36.3***	-4.6	15.4	17.2	17.4	13.1	11.8	1.1
Age												
< 24 y	14.8	18.7	18.4	24.4***	26.2***	-1.5	22.0	23.1	24.8	12.8***	5.2*	7.3**
24 y	18.7	20.3	24.1	29.3***	8.9	18.8**	8.8	9.7	10.8	23.0*	10.5	11.3
Year in school												
Freshman	22.0	24.7	24.7	12.4*	12.4*	0.0	21.1	23.1	22.3	5.5	9.5	-3.7
Sophomore	17.5	20.1	21.0	20.0***	15.1**	4.2	20.1	22.5	24.1	20.1***	11.7*	7.5
Junior	13.5	17.9	17.4	28.5***	32.1***	-2.7	20.2	20.9	23.2	15.1**	3.8	10.9*
Senior	12.3	14.9	15.2	24.4***	21.4**	2.5	19.4	18.7	22.3	14.7**	-3.8	19.2***
5th	11.1	14.2	15.8	41.9***	27.5*	11.3	17.2	18.9	20.5	19.2*	10.0	8.4
Residence												
Dormitory	17.3	19.3	19.9	14.9***	11.4*	3.1	22.5	22.5	23.0	2.2	0.2	2.0
Fraternity/sorority house	1.2	3.0	4.4	257.7**	146.3	45.2	49.4	52.5	51.1	3.5	6.4	-2.7
Off campus	15.3	18.9	18.6	21.9***	23.8***	-1.6	17.0	18.8	22.1	29.9***	10.5**	17.5***
Fraternity/sorority member	5.6	8.1	8.5	53.2***	45.8***	5.1	34.3	38.6	39.6	15.3***	12.3**	2.7
Binged in high school												
No	21.2	25.5	26.4	24.6***	20.1***	3.8	10.9	11.3	12.2	11.5**	3.9	7.3
Yes	3.3	3.7	2.8	-15.4	9.9	-23.0*	38.2	43.3	46.7	22.1***	13.4***	7.7**
Marital status												
Never married	14.4	17.8	18.2	25.9***	23.3***	2.1	21.7	22.8	24.4	12.3***	4.8*	7.2**
Married	22.9	28.0	29.1	27.4***	22.3***	4.1	4.7	5.3	6.4	38.1*	13.6	21.6

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

The data in Table 5 show changes in the prevalence of binge drinking in terms of college characteristics. In comparing colleges in various categories according to characteristics of the institution, we found that the prevalence of binge drinking at most types of colleges did not change between 1993 and 1999. Where significant changes emerged, as in the case of competitive standings of institutions, there was no clear pattern or direction of change. The abstainer and frequent binge-drinker rates at most types of colleges increased between 1993 and 1997 and did not change between 1997 and 1999. The rise in both abstention and frequent binge drinking between 1993 and 1999 occurred in most college subgroups (Table 6).

From 1993 to 1999, an increase in binge-drinking rates was observed at 53% of the 119 participating colleges but

was statistically significant at only 7 schools (6%). A decrease in binge-drinking rates was observed at almost an equal number of participating colleges (47%) and was statistically significant for only 8 schools (7%). Thus, the results indicating no change among students at all colleges are reinforced when individual colleges are examined.

The polarization in college drinking appeared when we examined data from individual colleges from 1993 to 1999. An increase in abstention was observed at 3 out of 4 colleges (77%), and was statistically significant for 19 (16%) schools. This was in contrast to decreases in abstainers at only 23% of the colleges; none of the decreases reached statistical significance. An increase in frequent binge drinkers was observed at 83 (70%) out of 119 colleges and was statistically significant for 11% of schools. On the other hand,

TABLE 5
Changes in Prevalence of Binge Drinking, 1993, 1997, 1999,
by College Characteristics

College characteristic	N	Prevalence (%)			Change (%)		
		1993	1997	1999	'93 v '99	'93 v '97	'97 v '99
Total	119	44.5	42.9	44.1	-0.8	-3.6**	2.9*
Commuter school†	17	30.9	31.9	31.4	1.5	3.1	-1.5
Not commuter school	102	46.9	44.7	46.2	-1.6	-4.7***	3.3*
Not competitive‡	25	39.5	38.2	39.5	0.1	-3.3	3.5
Competitive	43	46.2	44.7	42.2	-8.7***	-3.3	-5.6*
Very competitive	31	45.9	44.3	49.8	8.6***	-3.5	12.5***
Highly competitive	19	46.2	43.7	45.1	-2.4	-5.4	3.2
Small < 5000	40	43.3	42.3	41.1	-5.1*	-2.3	-2.9
Medium 5001-10 000	27	42.9	41.7	45.0	4.8	-2.8	7.9*
Large > 10 001	52	45.6	43.6	45.8	0.5	-4.3*	5.0*
Public	82	45.0	43.3	44.6	-0.9	-3.7*	2.9
Private	37	43.2	42.0	43.1	-0.3	-3.0	2.7
Northeast	28	50.1	45.5	47.9	-4.3	-9.2***	5.4*
South	35	43.2	40.7	42.4	-1.8	-5.7*	4.2
North Central	35	48.1	48.0	48.6	0.9	-0.2	1.1
West	21	33.6	34.3	34.4	2.6	2.1	0.5
Religious affiliation	19	41.3	41.3	42.9	3.7	0.0	3.7
Nonreligious	100	45.0	43.2	44.6	-1.0	-4.0**	3.2
Rural/small town	34	49.7	46.2	48.9	-1.6	-7.1***	5.8**
Suburban/urban	85	41.8	41.1	42.2	0.9	-1.7	2.6
Women only	6	28.9	30.6	31.3	8.4	6.1	2.1
Not women's college	113	45.0	43.6	44.9	-0.4	-3.2*	2.9*

Note: College characteristics may vary slightly from those reported in the 1993 and 1997 studies.

†Commuter schools were defined as schools with 90% of students living off campus.

‡Competitiveness is based on ACT and SAT scores and percentage of applicants accepted, as reported in *Barron's Profiles of American Colleges*.²⁰

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

we observed a decrease in frequent binge drinkers at only 30% of colleges. It was statistically significant for only 3 (3%) schools.

Drinking Style

The data in Table 7 indicate changes in drinking style among students who drank alcohol in the past year. The intensity of their drinking increased significantly between 1993 and 1999. In 1999, a greater percentage of both male and female students drank on 10 or more occasions; usually binged when they drank; were drunk three or more times in the past month; and drank to get drunk. Although we found a general increase in drinking intensities from survey to survey, the strongest increase had occurred by 1997.

Prevalence of Alcohol-related Problems

In 1999, the prevalence of each of 12 alcohol-related educational, interpersonal, health, and safety problems among college men and women who drank any alcohol in the past year was significantly higher than in 1993. These increases had occurred by 1997, and additional increases did not

appear between 1997 and 1999. In fact, some problems decreased significantly between 1997 and 1999 but were still significantly higher than in 1993.

Risk of Alcohol-related Problems

In the 1999 study, as in the previous studies, occasional binge drinkers and frequent binge drinkers were more likely to experience alcohol-related problems than those who drank alcohol but did not binge (Table 8). Occasional binge drinkers were 5 times as likely as nonbinge drinkers to report they had experienced 5 or more of 12 different alcohol-related problems, whereas frequent binge drinkers were 21 times as likely to do so. This result is consistent with previous years. Frequent binge drinkers, in contrast to nonbinge drinkers, were 4 to 15 times more likely to experience a particular problem as a result of their drinking.

Secondhand Binge Effects

We examined the secondhand binge effects experienced by nonbinge drinkers and abstainers who lived in dormi-

TABLE 6
College Student Patterns of Alcohol Use, 1993, 1997, 1999, by College Characteristics

College characteristic	Abstainers						Frequent bingers					
	Prevalence (%)			Change (%)			Prevalence (%)			Change (%)		
	1993	1997	1999	'93 v '99	'93 v '97	'97 v '99	1993	1997	1999	'93 v '99	'93 v '97	'97 v '99
Commuter school†	17.1	21.5	24.3	42.2***	26.2***	12.6*	11.2	11.9	12.8	14.0	5.9	7.7
Not commuter	15.1	18.5	18.4	21.8***	22.1***	-0.3	21.3	22.4	24.3	13.8***	5.0*	8.4***
Not competitive‡	17.4	21.8	19.9	14.9**	25.4***	-8.4	15.9	17.9	18.5	16.7**	12.7*	3.6
Competitive	13.8	17.2	21.2	53.5***	24.4***	23.4***	22.0	22.6	21.9	-0.3	3.1	-3.3
Very competitive	17.3	20.3	15.4	-10.9*	17.7***	-24.3***	20.5	21.5	26.7	29.9***	4.9	23.9***
Highly competitive	12.8	15.5	20.3	58.3***	21.2*	30.6***	19.0	20.7	23.6	23.9***	8.7	14.0*
Small < 5001	16.3	19.8	19.7	20.7***	21.1***	-0.3	19.0	20.8	20.2	6.0	9.2*	-2.9
Medium 5001-10 000	15.1	19.2	18.4	21.7***	27.3***	-4.4	18.7	19.1	22.9	22.5***	2.0	20.0***
Large > 10 001	15.1	18.3	19.4	28.2***	21.3***	5.7	20.6	21.7	24.4	18.4***	5.4	12.4***
Public	14.5	17.9	18.6	28.3***	23.4***	4.0	20.1	21.2	23.1	14.9***	5.6*	8.8**
Private	17.8	21.1	20.7	16.4***	18.9***	-2.1	19.1	20.3	21.8	14.0**	6.1	7.5
Northeast	12.2	15.3	14.9	21.8**	25.3***	-2.7	23.5	22.3	24.7	5.1	-5.4	11.1*
South	17.4	21.0	20.8	20.1***	20.9***	-0.7	19.4	20.6	22.6	16.6***	5.9	10.1*
North Central	12.4	16.3	16.4	32.2***	31.0***	0.9	21.6	24.1	25.6	18.8***	11.8**	6.2
West	21.3	24.6	26.9	26.4***	15.5**	9.4	12.9	14.3	15.2	17.8*	10.9	6.2
Religious affiliation	23.1	25.7	25.0	8.5	11.3*	-2.5	19.9	21.8	22.8	14.7*	9.6	4.7
Nonreligious	14.2	17.6	18.2	28.5***	23.9***	3.7	19.8	20.7	22.7	14.4***	4.8	9.3***
Rural/small town	13.8	18.3	17.9	30.1***	32.8***	-2.0	23.2	23.9	26.1	12.6***	2.8	9.4**
Suburban/urban	16.3	19.3	17.8	9.3***	18.3***	-7.6	18.1	19.3	21.3	17.9***	7.1*	10.1*
Women only	20.8	18.6	18.7	-10.5	-10.7	0.3	7.4	11.1	14.1	90.2***	50.3*	26.5
Not women's college	15.2	18.9	19.3	26.4***	24.3***	1.7	20.2	21.5	23.2	14.6***	6.1*	8.0***

†Commuter schools were defined as schools with 90% of students living off campus.

‡Competitiveness is based on ACT and SAT scores and percentage of applicants accepted, as reported in *Barron's Profiles of American Colleges*.²⁰

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

tories or fraternity or sorority residences. In 1999, as in 1993 and 1997, the most frequent problems were (a) being interrupted while studying or being awakened at night (58%), (b) having to take care of a drunken fellow student (50%), and (c) being insulted or humiliated (29%). About 3 out of 4 students (77%) experienced at least one secondhand effect.

We found no clear pattern of change in the rates of secondhand effects in the 3 survey years. Some problems, such as experiencing an unwanted sexual advance and having to take care of a drunken student, increased significantly. Other problem experiences, such as being pushed, hit, or assaulted, or being the victim of sexual assault or date rape, decreased significantly.

Secondhand Binge Effects at High-binge, Medium-binge, and Low-binge Campuses

In 1999, as in the previous study, students who did not binge drink and who lived in a dormitory or fraternity or sorority house on high-binge campuses were twice as likely as nonbinge drinkers and abstainers on low-binge campuses to report experiencing any of the secondhand effects listed in the study. In addition, they were three times as likely to report at least one such effect (Table 9).

COMMENT

A Cautionary Note About Student Surveys

The CAS is based on self-reported responses to a mail survey and is subject to sources of error associated with this approach. First, respondents may intentionally or unintentionally distort their answers. However, a number of studies support the validity of self-reports of alcohol use.^{13,15} The same pattern of responses among different student subgroups is present in all 3 years of the study, as well in other major studies of college alcohol use.^{5,7,16}

Second, another possible source of bias may be introduced through sample attrition or nonresponse. Although we received responses from 60% of the students in the random samples in 1999 and 1997, these rates were lower than the 1993 rate (70%). However, the binge-drinking rates in the CAS in all 3 survey years were almost identical to rates obtained by other researchers who used different sampling methods.^{5,7,8} Furthermore, the statistical controls we used to examine potential bias revealed no association between student nonresponse and binge-drinking rates in any of the 3 survey years.

The CAS did not have an equivalent time period in investigating change over the 6-year period. It is possible that

TABLE 7
Drinking Styles of Students Who Consumed Alcohol,
1993, 1997, 1999, by Gender

Drinking style	Prevalence (%)			Change (%)		
	1993	1997	1999	'93 v '99	'93 v '97	'97 v '99
Drank on 10 or more occasions in the past 30 days						
Total	17.9	20.6	22.2	24.2***	15.5***	7.5**
Male	24.1	28.2	30.7	27.1***	17.0***	8.6*
Female	12.8	15.2	16.5	28.6***	18.7***	8.4
Usually binges when drinks						
Total	40.4	41.6	44.5	10.2***	2.9	7.0***
Male	43.2	43.2	47.3	9.7***	0.0	9.6***
Female	38.2	40.5	42.6	11.7***	6.0*	5.3*
Was drunk three or more times in the past month						
Total	23.1	28.0	29.3	26.5***	21.1***	4.5
Male	28.3	33.7	35.9	26.9***	19.1***	6.5*
Female	18.9	23.9	24.8	30.9***	26.3***	3.6
Drinks to get drunk†						
Total	39.7	52.4	47.2	18.9***	32.0***	-9.9***
Male	45.0	58.5	54.4	20.9***	29.8***	-6.9***
Female	35.6	48.3	42.7	19.7***	35.5***	-11.6***

Note. Only students who drank alcohol in the last year are included.

†Say that getting drunk is an important reason for drinking.

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

TABLE 8
Risk of Alcohol-Related Problems Among Students in Different Binge Drinking Categories, 1999

Problem	Nonbinge drinkers	Occasional binge drinkers		Frequent binge drinkers			
	(n = 5063) %	(n = 2962) %	Adjusted OR	95% CI	(n = 3135) %	Adjusted OR	95% CI
Miss a class	8.8	30.9	4.70	4.01, 5.51	62.5	16.86	14.40, 19.80
Get behind in schoolwork	9.8	26.0	3.17	2.70, 3.72	46.3	7.94	6.81, 9.28
Do something you regret	18.0	39.6	2.85	2.50, 3.25	62.0	6.94	6.08, 7.93
Forget where you were or what you did	10.0	27.2	2.82	2.41, 3.29	54.0	8.36	7.22, 9.71
Argue with friends	9.7	23.0	2.68	2.28, 3.14	42.6	6.24	5.37, 7.26
Engage in unplanned sexual activities	7.8	22.3	3.17	2.68, 3.76	41.5	7.04	6.00, 8.28
Not use protection when you had sex	3.7	9.8	2.88	2.29, 3.64	20.4	6.13	4.95, 7.63
Damage property	2.3	8.9	2.92	2.20, 3.90	22.7	9.75	7.57, 12.72
Get into trouble with campus or local police	1.4	5.2	3.00	2.08, 4.39	12.7	8.07	5.84, 11.40
Get hurt or injured	3.9	10.9	2.67	2.10, 3.39	26.6	8.16	6.60, 10.16
Require medical treatment for an alcohol overdose	0.3	0.8	2.73	1.17, 6.73	0.9	3.40	1.42, 8.72
Drove after drinking alcohol	18.6	39.7	2.87	2.53, 3.27	56.7	7.64	6.75, 8.66
Have five or more different alcohol-related problems	3.5	16.6	4.59	3.69, 5.74	48.0	21.11	17.25, 26.04

Note. Only students who drank alcohol in the past year are included. Problems did not occur at all or occurred one or more times. Sample sizes vary slightly for each category because of missing values. OR = odds ratio; CI = confidence interval. Adjusted ORs of occasional binge drinkers v nonbinge drinkers are significant at $p < .001$ (OR adjusted for age, sex, marital status, race/ethnicity, and parental college education). Adjusted ORs of frequent binge drinkers v nonbinge drinkers are significant at $p < .001$ (OR adjusted for age, sex, marital status, race/ethnicity, and parental college education).

TABLE 9
Risk of Experiencing Secondhand Binge Drinking Effects by Students at Low-, Middle-, or High-level Binge Drinking Campuses

	Low	Medium		High			
	(n = 963) %	(n = 934) %	Adjusted OR	95% CI	(n = 1019) %	Adjusted OR	95% CI
Been insulted or humiliated	20.5	29.3	1.65	1.23, 2.19	35.8	2.06	1.57, 2.73
Had a serious argument or quarrel	13.7	18.6	<i>ns</i>		22.6	1.60	1.18, 2.19
Been pushed, hit, or assaulted	5.5	9.5	2.16	1.35, 3.51	10.9	1.94	1.19, 3.15
Had your property damaged	7.4	13.6	2.60	1.72, 4.02	16.0	2.76	1.81, 4.19
Had to take care of a drunken student	37.3	53.6	1.92	1.50, 2.46	57.2	2.11	1.65, 2.69
Had your studying/sleeping interrupted	43.2	60.5	2.32	1.82, 2.97	70.5	2.98	2.33, 3.81
Experienced an unwanted sexual advance†	14.7	20.1	<i>ns</i>	—	22.6	1.73	1.26, 2.38
Been a victim of sexual assault or date rape†	0.6	1.3	<i>ns</i>	—	1.0	<i>ns</i>	—
Experienced at least one of the above problems‡	63.7	81.3	2.44	1.85, 3.24	86.3	3.24	2.43, 4.32

Note. Analyses are limited to nonbinge drinkers and abstainers who lived in dormitory or fraternity or sorority residences. School binge levels were divided as follows: low binge = 37%, medium = 37%–50%, and high > 50%. OR = odds ratio; CI = confidence interval; *ns* = not significant. Adjusted ORs of students at schools with middle-level binge drinking v students at lower-level schools are significant at $p < .05$, and adjusted ORs of students at schools with high levels of binge drinking v students at schools with low levels are also significant at $p < .05$ (OR adjusted for age, sex, marital status, race/ethnicity, and parents' college education).

†Analyses are based on responses of women only.

‡Available marital status was excluded from the adjusted OR.

changes during the 2-year period from 1997 to 1999 may be more difficult to detect than changes over the years from 1993 to 1997. We urge readers to use caution in interpreting our finding that the rates changed more between 1993 and 1997 than between 1997 and 1999.

Finally, the data presented in this article describe all colleges in the sample or college subgroupings. Within these national norms, individual colleges may vary extensively. For example, although the national binge-drinking rate is 44%, the rate ranged from less than 1% at the lowest binge school to 76% at the highest.

Findings and Conclusion

Surveys of representative samples of college students at 119 colleges in 39 states in 1993, 1997, and 1999 have yielded remarkably similar rates of binge drinking over the past 6 years. Two of 5 college students were classified as binge drinkers in each of the three surveys. Although no change occurred in the overall binge-drinking rate, the nature of drinking among students who drink has become more extreme, with a significant increase in heavier drinking throughout the entire 6 years. We noted increases in the number of frequent binge drinkers between 1993 and 1999, as well as in the proportion of students who were drunk three or more times, who drank on 10 or more occasions, who usually binged when they drank, and who drank to get drunk. Among drinkers, the proportion of frequent binge drinkers increased from 23.4% in 1993 to 28.1% in 1999.

During the same 6 years, the rates of abstaining from alcohol increased from 15.4% to 19.2%.

Most of the increase in abstention had occurred by 1997. These patterns of change have resulted in greater polarization in drinking behaviors on campuses. Although 2 out of 3 students who live in fraternity or sorority houses are binge drinkers, 1 in 3 (33.2%) students who lives in a campus residence hall or dormitory lives in an alcohol-free residence. An additional 12.6% of the respondents who did not currently live in such housing indicated that they would like to live in alcohol-free quarters.

From 1993 to 1999, the proportion of binge drinkers remained very similar for almost all subgroups of students and in all types of colleges. The same types of students who had the highest rates of binge drinking in 1993 and 1997 continued to have those high rates in 1999. Among the students most likely to binge drink were fraternity or sorority house residents and members of Greek organizations and students who were White, male, and were binge drinkers in high school. The students least likely to binge drink continued to be African American or Asian, aged 24 years or older, married, and who were not binge drinkers in high school.

The only exception to the lack of change in binge drinking during the 6-year period related to place of residence. Binge-drinking rates decreased among students living in dormitories and increased among students living off campus. This finding may be important in understanding current efforts at prevention of high-risk drinking.

In recent years, some debate has occurred about the five/four measure of binge drinking (five drinks for men, four for women).¹⁷ Does it overstate the problem or label normative behavior as deviant? Findings from this study continue to show that students who drink at these levels, particularly those who do so more than once a week, experience a far higher rate of problems than other students. For example, frequent binge drinkers are likely to miss classes (OR = 16.9), to vandalize property (OR = 9.7), and to drive after drinking (OR = 7.6). Indeed, the frequent binge drinkers are also more likely to experience 5 or more different alcohol-related problems (OR = 21.1).

Students on campuses that have many binge drinkers experienced higher rates of secondhand problems, compared with students on campuses with lower rates of binge drinking. Students who did not binge drink and lived on high-binge campuses were twice as likely to report being assaulted, awakened, or kept from studying by drinking students than were nonbinge drinkers and abstainers at low-binge campuses. A student who did not binge drink on a high-binge campus was 3 times more likely than his or her counterpart on a low-binge campus to report at least one secondhand effect. These findings indicate that students who drink at the binge level create problems for themselves and for other students at their colleges. Indeed, we have previously reported that frequent binge drinkers consumed two thirds of all the alcohol college students drink. They also accounted for more than three fifths of the most serious alcohol-related problems on campus.

Some Future Thoughts: Going Beyond the Data

In a companion article in this issue, we report on a survey of college administrators' views and actions in dealing with binge drinking.¹⁸ Their responses indicate that they have a great deal of concern about student drinking and that most colleges are taking actions to address the problem. Why, then, do rates of binge drinking continue to be this high? Why do we find an increase in the most extreme forms of drinking? Perhaps not enough time has passed since the initial studies attracted attention to the serious problem of college alcohol abuse for change to occur.

Another explanation may be related to the types of actions college officials are taking. Almost all colleges employ educational approaches to effect change. Certainly that is an appropriate strategy for academic institutions. Yet, we know that most students have received information about drinking and that those groups with the highest binge-drinking rates (athletes and fraternity members) have received the most information (Nelson TF, Wechsler H, unpublished data, 1999).¹⁹ Although these educational programs are reaching the right target audiences, they have not resulted in decreased binge drinking and we cannot expect this strategy to accomplish this difficult task by itself.

The apparent inadequacy of even targeted educational efforts to change problem drinking among high-risk groups is not surprising. Public health is increasingly recognizing that education and information alone are not

enough to change behavior. In our opinion, we need more support from additional, complementary initiatives. Prevention efforts must work on the alcohol supply, and they must increase the involvement of role models, those who shape opinions, and policy makers beyond the college campus, including community members and students' families.

The finding that binge drinking decreased among students living on campus but increased among those living off campus may reflect the current focus of prevention efforts. Without involving the community and the way alcohol is marketed, efforts to decrease binge drinking may simply displace it.

A comprehensive approach to student binge drinking should consider such factors as

- Alcohol marketing, outlet density, price, special promotions, and the volume in which alcohol is sold.
- Drinking history of students before they come to college. Working with high schools to decrease binge drinking should result in reducing the problem in colleges.
- Assuring alcohol-free social and recreational activities for students on weekends so that they have more to do than just "party."
- Increasing educational demands in terms of Friday classes and exams to reduce the length of the weekend and provide full-time education for full-time tuition.
- Enacting control policies and enforcing them, recognizing that the heaviest binge drinkers will not change unless forced to do so. These students do not think they have a drinking problem. They consider themselves moderate drinkers, and they are not ready to change. They may require an offer they cannot refuse. "Three strikes and you're out" (a punishment appropriate to the level of the violation) and parental notification may be strategies needed for these students. Although social marketing may be effective for some students (eg, those who are less committed to the binge-drinking lifestyle), it may not succeed with others.

Finally, there are no magic solutions. Just as no single technique applies to all students, no single approach applies to all colleges. Colleges differ in the roles that factors, such as fraternities, intercollegiate athletics, and drinking traditions, play on campus, as well as in the academic demands they make on student performance and the options that students have for recreation and social life. Alcohol control laws and their enforcement differ in the state and local communities in which colleges are located. All of these factors must be taken into consideration in planning a comprehensive response to student binge drinking.

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NOTE

For further information, please address communications to Henry Wechsler, PhD, Department of Health and Social Behavior, Harvard School of Public Health, 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, Isaac N. "Binge" drinkers at Massachusetts colleges: Prevalence, drinking style, time trends, and associated problems. *JAMA*. 1992;267:2929-2931.
3. Wechsler H, Molnar B, Davenport A, Baer J. College alcohol use: A full or empty glass? *J Am Coll Health*. 1999;47(6):247-252.
4. Wechsler H, Davenport A, Dowdall G, Grossman S, Zanakos S. Binge drinking, tobacco, and illicit drug use and involvement in college athletics: A survey of students at 140 American colleges. *J Am Coll Health*. 1997;45(5):195-200.
5. Johnston LD, O'Malley PM, Bachman JG. *National Survey Results on Drug Use From the Monitoring the Future Study, 1975-1995. Vol II, College Students and Young Adults*. US Dept of Health and Human Services; NIH Publication number 98-4140;1997.
6. 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.
7. Presley CA, Meilman PW, Cashin JR, Lyster R. *Alcohol and Drugs on American College Campuses: Use, Consequences, and Perceptions of the Campus Environment. Vol IV: 1992-94*. Carbondale, IL: Southern Illinois University; 1996.
8. Douglas KA, Collins JL, Warren C, et al. Results from the 1995 National College Health Risk Behavior Survey. *J Am Coll Health*. 1997;46(2):55-66.
9. 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.
10. Liang KY, Zeger SL. Longitudinal data analysis using generalized linear models. *Biometrik*. 1992;73:12-22.
11. Zeger SL, Liang KY, Albert PS. Models for longitudinal data: A generalized estimating equation approach. *Biometrics*. 1988;44:1049-1060.
12. US Dept of Education. *Digest of Education Statistics*. Washington, DC: National Center of Educational Statistics; 1998.
13. 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.
14. Cooper AM, Sobell MB, Sobell LC, Maisto SA. Validity of alcoholics' self-reports: Duration data. *Int J Addict*. 1981;16:401-406.
15. Midanik L. Validity of self-report alcohol use: A literature review and assessment. *Brit J Addict*. 1988;83:1019-1030.
16. Centers for Disease Control and Prevention. Youth Risk Behavior Surveillance: National College Health Risk Behavior Survey, United States. *MMWR*. 1997;46(SS-6):1-54.
17. Wechsler H, Austin SB. Binge drinking: The five/four measure. *J Stud Alcohol*. 1998;59(1):122-124.
18. Wechsler H, Kelly K, Weitzman E. What colleges are doing about student binge drinking: A survey of college administrators. *J Am Coll Health*. 2000;48:219-226.
19. 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*. In press.
20. *Barron's Profiles of American Colleges*. Hauppauge, NY: Barron's Educational Series; 1996.