

Effectiveness of a web-based alcohol-misuse and harm-prevention course among high--and low-risk students

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Abstract:

Objective: In the current study, the authors assessed whether a new online alcohol-misuse prevention course (College Alc) is more effective at reducing alcohol use and related consequences among drinkers and nondrinkers. **Participants:** The authors compared incoming college freshmen who reported any past 30-day alcohol use before the beginning of the semester with those who did not. **Method Summary:** The authors randomly assigned students who completed a precollege baseline survey to either complete a 3-hour noncredit version of College Alc or serve as members of a control group. The authors conducted a follow-up survey 3 months later. **Results:** Findings indicated that among freshmen who were regular drinkers before college, College Alc appeared to reduce the frequency of heavy drinking, drunkenness, and negative alcohol-related consequences. Among freshmen who did not report any past-30-day alcohol use before college, College Alc did not appear to have any beneficial effects. **Conclusions:** Results suggest that College Alc may be an effective program for students with a history of alcohol use.

Keyword: alcohol use | college students | harm prevention | heavy drinking

Article:

Heavy drinking among college students remains unacceptably high. National surveys indicate that 69.6% of college students have had an alcoholic beverage in the past 30 days ⁽¹⁾ and that 44.4% of college students report heavy drinking--defined as 5 or more alcoholic drinks in a row for men and 4 or more alcohol drinks in a row for women ⁽²⁾--at least once in the past 2 weeks. Alcohol-related problems are also prevalent among college students. Researchers in one national study estimated that more than 1,400 student deaths occur each year from alcohol-related incidents (eg, motor vehicle crashes), whereas more than 500,000 unintentional injuries and 600,000 intentional injuries (ie, assaults) also result from student alcohol use. ⁽³⁾ As a result, several 2010 Health Objectives focus on alcohol use among college students, such as reducing the percentage of college students engaging in binge drinking to 20% and increasing the percentage of students who receive information on health risk behaviors, including alcohol use, from 6% to 25% by 2010. ⁽⁴⁾ Also, a number of effective alcohol-misuse prevention programs have been developed for college students who regularly engage in heavy drinking. ^(5,6) However, these students may represent only a fraction of the students who may be at risk for alcohol

misuse and alcohol-related problems. Recent research results indicate that infrequent or light-moderate drinkers account for the majority of alcohol-related problems, as they represent the majority of students who drink. ^(7,8)

In recent years, a number of universal computer- and Web-based programs (eg, Alcohol Edu) ⁽⁹⁾ have been developed to reach larger numbers of students, including those who may not regularly engage in alcohol use or heavy drinking, but researchers have conducted few randomized studies to evaluate such programs. We addressed this research gap and examined whether a new online alcohol-misuse prevention course (College Alc) is more effective at reducing alcohol use and related negative consequences among college students who report any current alcohol use (at least once in the past 30 days) at baseline compared with those who did not report any alcohol use in the past month.

Results of a number of recent studies suggest that some targeted interventions and prevention programs may be more effective among frequent heavy drinkers. ⁽¹⁰⁻¹²⁾ For example, in a recent evaluation of Brief Alcohol Screening and Intervention for College Students (BASICS), researchers randomly assigned heavy drinking college students to 1 of 3 conditions: BASICS, an educational video/discussion intervention, and a control group. At the 3-month follow-up, results indicated that the most frequent heavy drinkers (students who had consumed at least 26 drinks in the past 30 days at baseline) assigned to the BASICS intervention reported greater reductions in drinks per week and less heavy drinking than frequent heavy drinkers in the educational or control condition. Effects of the BASICS program were not as pronounced among less frequent heavy drinkers. ⁽¹¹⁾

Donohue et al ⁽¹⁰⁾ compared the effectiveness of 2 brief alcohol-misuse prevention programs--Alcohol 101 on CD-ROM and Cognitive Behavior Therapy (CBT)--in a sample of student drinkers. Results indicated that CBT was more effective than was Alcohol 101 for the heaviest drinkers (students who had consumed at least 24 drinks in the past 30 days at baseline). Chiauuzzi et al ⁽¹³⁾ more recently evaluated a brief Web-based drinking prevention program, Mystudentbody.com. The results suggest that relative to the control group who read online research articles about excessive drinking once a week over a 4-week period, persistent heavy drinkers who participated in Mystudentbody.com reported a greater decrease in both average and peak alcohol consumption. Together, these results suggest that targeted alcohol-misuse prevention programs for high-risk students may be more effective among the heaviest drinkers relative to others. However, no studies have compared the effectiveness of universal prevention programs (ie, programs designed for all students, not just heavy drinkers) on heavy alcohol use and related problems among students in high- and low-risk groups prior to college.

Paschall et al ⁽¹⁴⁾ recently found that college freshmen who participated in College Alc reported lower frequencies of alcohol use, heavy drinking, and negative-drinking consequences in the past 30 days than did students in the control group, but these differences were not statistically significant. However, the data are not representative of possible differences in College Alc effects between freshmen who were regular drinkers before college and those who were infrequent drinkers or nondrinkers. Incoming freshmen who regularly engaged in alcohol use prior to college may have benefited more from College Alc than did infrequent drinkers or nondrinkers because they were at greater risk for heavy alcohol use and negative-drinking consequences. Thus, College Alc may have been more relevant to their alcohol-related

experiences and skills needed to minimize alcohol-related harm. We conducted our study to test this hypothesis.

METHODS

Sample Recruitment and Study Procedures

We invited incoming freshmen at a northern California public university to participate in the College Alc evaluation study during on-campus orientation sessions and through a letter and e-mail recruitment effort in August 2004. We sent an invitation letter to 2,344 prospective freshmen (ie, high school graduates who had been accepted for admission to the university) at their home addresses before the beginning of the fall semester. We informed students that the purpose of the project was to evaluate the effectiveness of an online alcohol education and prevention course developed for college students. We informed them that if they were at least 18 years of age and chose to participate, we would ask them to complete an online questionnaire before the beginning of the semester and again at the end of the semester. We informed students that, upon completion of the baseline survey, they would be randomly assigned to either take the 3-hour, noncredit College Alc online course or participate as a member of the control group and receive no additional structured alcohol education. We also informed them that they would receive a check for \$10 for each completed survey and a check for \$50 if they completed College Alc. Although College Alc has 5 units, students who completed at least 3 units were paid \$50. Both the university Institutional Review Board (IRB) and the IRB of the independent evaluators' organization approved this protocol.

An e-mail invitation followed the mailed invitation letter with instructions on how to access a secure Web site that hosted the baseline survey. We sent students 3 additional reminder e-mails as needed over a 4-week period during which they were allowed to access the survey Web site. Because the department with which we were working did not have access to this information, we were unable to determine how many of the 2,344 students who were originally contacted were aged younger than 18 years and how many decided not to attend the university, thereby making them ineligible to participate in the study. The exact number of students contacted is also unknown because of incorrect mailing addresses and spam filters that blocked e-mail invitations. Therefore, we could not estimate the baseline survey participation rate with accuracy. Because our primary goal was to conduct a randomized controlled study with an adequate sample size, we were more concerned about the internal validity of the study design than the external validity. Therefore, we proceeded with the study, recognizing that results may not generalize to all freshmen attending the university.

A total of 622 students participated in the baseline survey and provided complete data for the evaluation. Following the completion of the baseline survey, we randomly assigned students to either the College Alc (n = 310) or control group (n = 312). We used a stratified randomization procedure based on 5 alcohol-use levels (lifetime abstainers, past-year but not lifetime abstinence, past-year but no past-month alcohol use, past-month alcohol use but no heavy drinking, and any heavy drinking in the past month) to ensure an equal balance of drinking levels in the treatment and control groups at baseline. We based these stratification levels on alcohol-use categories in the National Survey on Drug Use and Health.⁽¹⁵⁾

Via e-mail, we asked students assigned to the College Alc condition to complete the course during the first 6 weeks of the fall semester. We sent weekly e-mail reminders to students who

had not started or completed the course. Approximately 1 month after the course was closed, we sent all 622 students who completed the baseline survey an e-mail invitation to participate in the follow-up survey. Of those, 370 completed the follow-up survey and provided complete data for all study variables. The sample was ethnically diverse, with 30% of students identifying themselves as white (non-Hispanic), 16.5% Hispanic, 42% Asian/Pacific Islander, 4% black, and 8% other. The sample was evenly divided between men (48%) and women (52%), and the average age was 18 years (range = 18-20). Approximately 173 of these students were in the College Alc group, and 197 were in the control group. Of the students in the College Alc group, 81 completed all 5 units, 4 completed 4 units, 4 completed 3 units, 6 completed 2 units, 5 completed 1 unit, and 73 did not complete any units.

College Alc

Tanglewood Research, Inc. received a grant from the National Institute on Alcohol Abuse and Alcoholism (NIAAA) to develop and evaluate a novel Internet-based college alcohol education course, known as College Alc, a Web-based alcohol-misuse and harm-prevention course for college students.^(16,17) College Alc presents the latest research related to college alcohol use, social norms, consequences, harm prevention, and treatment. It does so through the use of interactive assignments, streaming video clips, personalized feedback, discussion forums, selected readings, and a student-generated harm-prevention plan. College Alc has 5 units: College Alcohol Use, Harm Prevention, How it Works (the physiological effects of alcohol), Risky Business (driving, sex, violence), and Practical Solutions. Each unit includes graphics and text, interactive animations, online assignments, readings, and a quiz. Four of the 5 units include a streaming video clip depicting college students in an alcohol-related context. The program targets theory- and research-based psychosocial mediators, including alcohol expectancies, behavioral intentions, and normative beliefs, and thus incorporates prevention strategies recommended by the NIAAA Advisory Council Task Force, such as⁽¹⁾ personalized feedback to help students monitor their drinking, correct their misperceptions of drinking norms, and clarify their personal values and attitudes toward alcohol use, and⁽²⁾ research-based information to challenge students' alcohol expectancies.⁽¹⁸⁾ These strategies are grounded in well-known theories of problem and health-related behavior and have been effective in brief interventions for high-risk students.^(5,6,19-21)

We based our study on an abbreviated noncredit version of College Alc. The original version of the course was a 3-credit course requiring an instructor. The noncredit version has fewer reading and writing assignments than does the 3-credit version. For example, instead of writing a 2-page paper for each unit, to be submitted by e-mail to the instructor, we told students to write 1 or 2 paragraphs and submit them to the class bulletin board. We estimated that the modified version would take 3 hours to complete. We gave students assigned to College Alc instructions to let them know that they were expected to complete all journal entries, bulletin board discussions, and unit quizzes as if they were taking the course as a university requirement.

Measures

We included the measures described below in both the baseline and follow-up surveys. We based alcohol-use measures on questions included in the National Survey on Drug Use and Health⁽¹⁵⁾ and the Centers for Disease Control and Prevention National College Health Risk Behavior Survey,⁽²²⁾ both of which include questions about the frequency of past-30-day alcohol use and heavy drinking. We used the 30-day time period to assess College Alc effects on drinking

behavior and consequences during the 30-day period following the program at the end of the fall semester.

Baseline Drinking Status

We asked students, "During the past 30 days, on how many days did you have alcohol (beer, wine, liquor, etc.)?" The 7 possible responses ranged from "0 days" to "all 30 days." We categorized students into 2 groups: those who reported no alcohol use in the past 30 days at baseline ($n = 139$) and those who reported alcohol use at least once in the past 30 days ($n = 231$).

Heavy Drinking

We asked students, "During the past 30 days, how many times have you had 5 or more drinks at a sitting?" The 6 possible response options ranged from "none" to "10 or more times." We recorded responses to the midpoints of response categories (eg, 6 to 9 times = 7.5), creating a range of response values from 0 to 12 (test-retest $r = .61$, $p < .01$). We also asked students to indicate how many days in the past month they felt drunk because of alcohol use. The 7 response options ranged from "0 days" to "all 30 days." We recorded responses to the midpoints of response categories, creating a range of response values from 0 to 30 (test-retest $r = .51$, $p < .01$).

Negative Alcohol-Related Consequences

We used a 27-item index to assess negative alcohol-related consequences among students who reported any alcohol use in the past 30 days. We based these items on a series of questions asked by Wechsler et al. ⁽²⁾ We asked students, for example, "In the past 30 days, how often has your drinking caused you to (a) get nauseated or vomit, (b) feel tired or hungover, (c) forget where you were or what you did, (d) get physically injured, (e) hurt another person emotionally or physically, (f) get into trouble with school authorities or the law, or (g) caused you to be taken advantage of sexually?" For each question, 6 possible response options ranged from "never" to "10+ times," with corresponding values ranging from 0 to 12 after recoding response categories to midpoints. We computed a summative score for each student, with a higher value representing more negative alcohol-related consequences in the past 30 days (test-retest $r = .20$, $p < .05$).

RESULTS

Study Attrition

We conducted t tests with baseline data to compare demographic and behavioral characteristics of students who completed both baseline and follow-up surveys ($n = 370$) with those who completed only the baseline survey ($n = 252$). The 2 groups were similar with respect to age, gender, several racial/ethnic categories (white, black, Asian), and level of alcohol use; however, Hispanic students were underrepresented in the final study sample. Preliminary analyses also revealed a lower percentage of black students who completed baseline and follow-up surveys in the College Alc group relative to the control group.

College Alc Effects by Baseline Drinking Status

Descriptive statistics in Table 1 provide preliminary evidence for differential College Alc effects among baseline drinkers versus nondrinkers. Baseline drinkers who participated in College Alc reported decreases in heavy drinking behavior, feeling drunk, and negative alcohol-related consequences in the past 30 days, whereas drinkers assigned to the control group reported

increases in these behaviors. Among nondrinkers, both students in the College Alc condition and those in the control group showed fairly consistent increases in heavy drinking, feeling drunk, and negative alcohol-related consequences in the past 30 days. However, Cohen's d ⁽²⁵⁾ suggested relatively small effect sizes. We used repeated measures analyses of variance (ANOVA) to assess differences in College Alc effects on heavy drinking and negative-drinking consequences among students in high-and low-risk groups (ie, baseline drinkers vs nondrinkers). ANOVA results in Table 2 indicated that, for heavy drinking in the past 30 days, there was a significant Treatment Group x Time x Drinking Status interaction, a significant Treatment Group x Time Interaction, and significant main effects for baseline drinking status and time. Mean values in Figure 1 indicated a beneficial College Alc effect among baseline drinkers, whereas we observed no College Alc effect among nondrinkers.

Table 1. Mean Scores for Drinking Behaviors and Related Consequences, by Baseline Drinking Status and Study Condition

	Baseline drinkers				Baseline nondrinkers			
	College Alc (n = 60)		Control (n = 79)		College Alc (n = 118)		Control (n = 113)	
Drinking status	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Heavy drinking								
Pretest	1.32	1.39	1.43	1.42	0		0	
Posttest	1.22	1.70	2.06	0.13	0.13	1.73	30.11	1.58
Cohen's d^*			.15				.01	
Felt drunk								
Pretest	1.86	2.24	2.16	2.30	0	0		
Posttest	1.43	2.24	2.47	2.22	0.13	2.28	0.25	2.23
Cohen's d^*			.09				.02	
Negative alcohol-related consequences								
Pretest	8.13	12.38	6.42	9.37	0		0	
Posttest	5.72	13.77	10.81	14.47	8.28	32.47	4.87	24.49
Cohen's d^*			.18				.03	

Note. Higher numbers represent greater drinking and more negative alcohol-related consequences. *SD* = standard deviation. *Cohen suggests that Cohen's d effect sizes should be interpreted as follows: small = .10, medium = .25, and large = .40.24

Table 2. Results of Repeated Measures Analysis of Variance Assessing Differential Effects of College Alc on Heavy Drinking, Feeling Drunk, and Negative Alcohol-Related Consequences, Among High- and Low-Risk Students

	Heavy drinking			Feeling drunk			Negative alcohol-related consequences		
Source	<i>df</i>	<i>F</i>	<i>MSE</i>	<i>df</i>	<i>F</i>	<i>MSE</i>	<i>df</i>	<i>F</i>	<i>MSE</i>
Between subjects									
Drinking status (DS)	1	93.57***		1	82.78***		1	7.37***	
College Alc (CA)	1	2.38		1	3.09*		1	0.00	
CA × DS	1	2.62*		1	2.18		1	1.05	
Error	366		3.83	366		7.38	366		155.45
Within subjects									
Time (T)	1	5.21**		1	0.26		1	7.88***	
T × DS	1	0.68		1	0.84		1	4.31**	
T × CA	1	4.56**		1	2.67*		1	0.39	
T × CA × DS	1	5.16**		1	1.41		1	3.58*	
Error	366		1.19	366		2.96	366		103.38

Note. MSE = mean squared error. * $p < .10$. ** $p < .05$. *** $p < .01$.

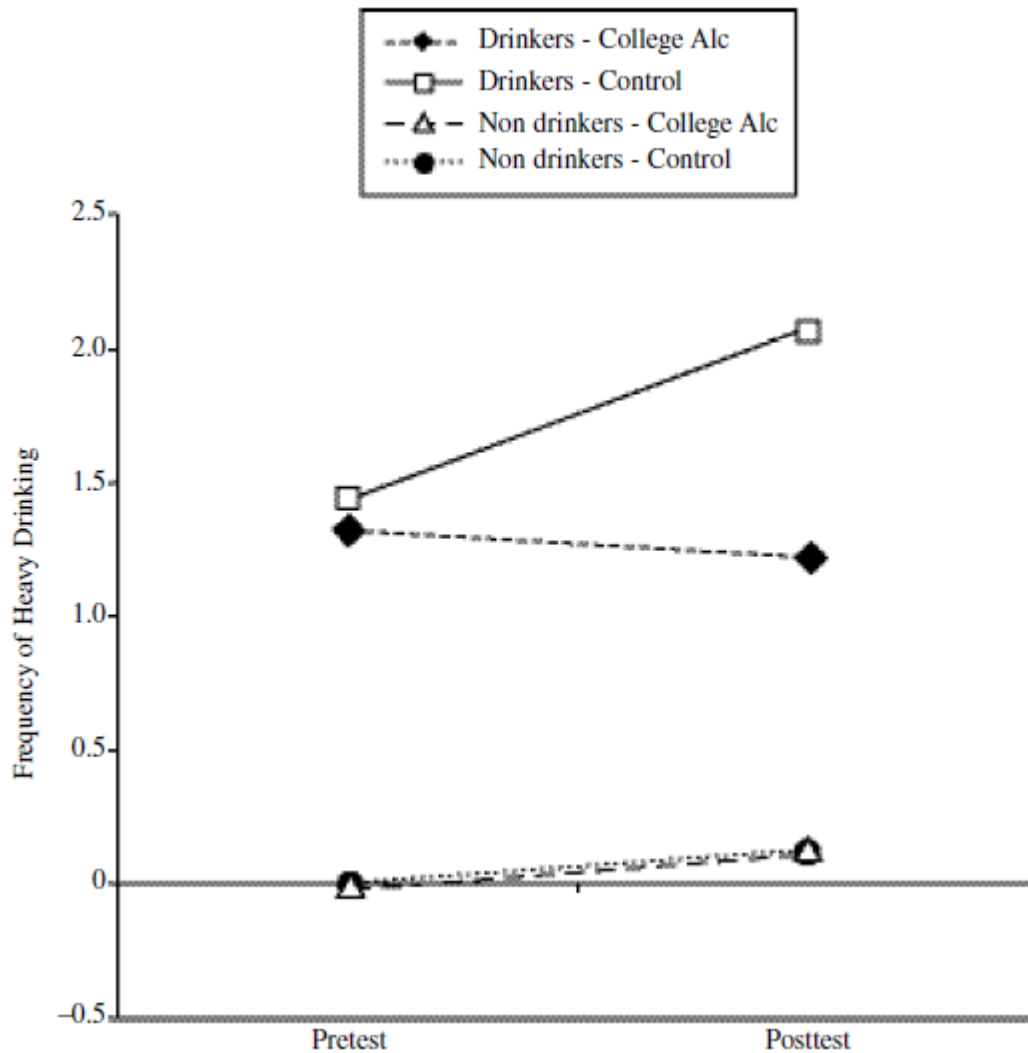


Figure 1. Change in past-30-day heavy drinking, by baseline drinking status and study condition.

Results in Table 2 indicated only significant main effects for baseline drinking status on drinking enough to feel drunk in the past 30 days. Exposure to College Alc was marginally significant as was a Time x Treatment Interaction. There were no statistically significant differences in the effects of College Alc between baseline drinkers and nondrinkers. However, mean values plotted in Figure 2 did suggest a differential College Alc effect, similar to that observed for heavy drinking in the past 30 days.

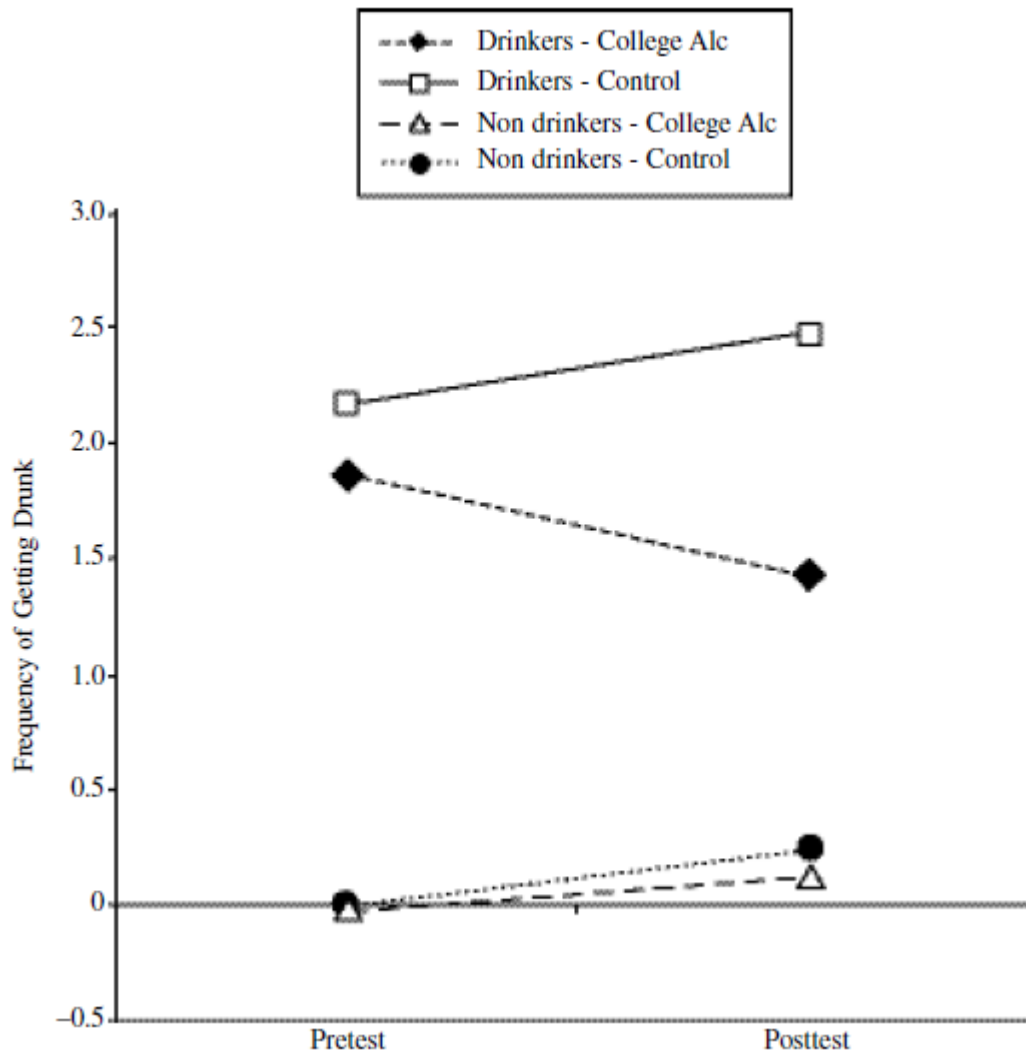


Figure 2. Change in getting drunk in the past 30 days, by baseline drinking status and study condition.

ANOVA results indicated a marginally significant Treatment Group x Time x Drinking Status Interaction, a significant Time x Drinking Status Interaction, and significant main effects for baseline drinking status and time for the outcome negative alcohol-related consequences (see Table 2). Mean values in Figure 3 indicated a beneficial College Alc effect on negative-drinking consequences among baseline drinkers, whereas we observed no College Alc effect among nondrinkers.

COMMENT

Identifying effective strategies to prevent heavy alcohol use and alcohol-related problems among college students remains a public health research priority.⁽¹⁸⁾ Although experts have developed a number of effective interventions for high-risk students,^(10,11) researchers have focused less attention on universal computer- or Web-based prevention strategies that are now being used by many colleges and universities to reach larger numbers of students. Our study was one of the first in which researchers used a randomized controlled design to assess the differential effects of

a universal Web-based alcohol-misuse and harm-prevention course among students at high- and low-risk for heavy drinking before college.

Conclusions

Results of this study suggest that College Alc may be more effective for students who regularly engage in alcohol use before college than for those who rarely or never engage in alcohol use. Among freshmen who were regular drinkers before college, College Alc appeared to reduce the frequency of heavy drinking, drunkenness, and negative alcohol-related consequences during the first fall semester. In contrast, among freshmen who did not report any past-30-day alcohol use before college, College Alc did not appear to have any beneficial effects during the first fall semester.

Our findings are consistent with other studies in which researchers found more beneficial effects of brief interventions, such as BASICS, among students at highest risk for heavy drinking and alcohol-related problems.⁽¹⁰⁻¹²⁾ Universal programs, such as College Alc, may also be more relevant and beneficial for students who have more experience with alcohol relative to those who infrequently or never engage in alcohol use. Results of this study suggests that College Alc is effective for students who reported any alcohol use during the 30 days prior to the fall semester, which represents a substantial proportion of incoming freshman. Prior research results indicate that almost 77% of students enter college with drinking experience and that more than 60% report having been drunk at least once in their lives.⁽²⁴⁾

Other results of analyses for the total study sample reported by Paschall et al,⁽¹⁴⁾ and additional analyses with only baseline student drinkers, indicated higher levels of alcohol-related knowledge, more accurate beliefs about other students' heavy drinking, and greater intentions to minimize alcohol-related harm among students who participated in College Alc relative to controls. Thus, College Alc does appear to affect heavy alcohol use and related consequences through psychosocial mechanisms identified in theory and previous research. However, College Alc did not appear to have an effect on alcohol expectancies or attitudes toward drinking among baseline drinkers. Thus, additional research with longitudinal data is needed to more rigorously evaluate and better understand the mediational mechanisms.

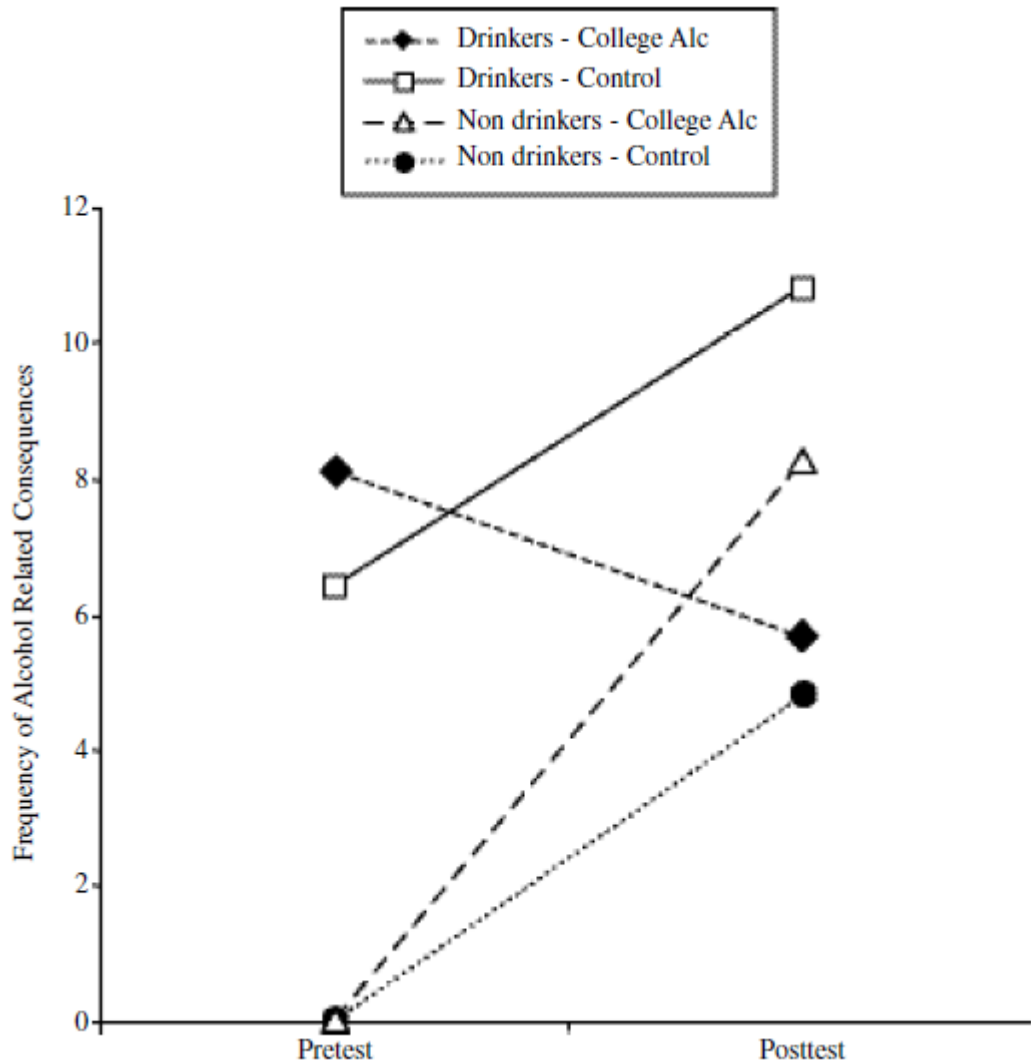


Figure 3. Change in negative alcohol-related consequences, by baseline drinking status and study condition.

Our findings suggest that College Alc could be targeted to high-risk student subgroups, such as fraternity members, athletes, and students who have incurred an alcohol-related infraction. The Web-based format could also be more cost-effective than other interventions (eg, BASICS) that require face-to-face interactions with trained counselors. This is especially true if researchers target large subgroups of students.

Additional research also is needed to identify universal prevention strategies that are beneficial for students without a history of alcohol use before college, but who are nevertheless at some risk for heavy-drinking and alcohol-related problems. Although levels of heavy drinking and drunkenness changed little among students whom we classified as nondrinkers at baseline, the frequency of negative alcohol related consequences increased substantially during the first fall semester, indicating the need for effective campus-wide harm-prevention strategies.

Limitations

Findings of this study should be viewed in light of several limitations. Because our sample was not representative, study findings may not generalize to other college freshmen. Attrition from the study may have biased analyses results in unknown ways. Self-report survey measures also may have been subject to recall and social desirability bias (eg, under-reporting heavy alcohol-use frequency). As noted above, College Alc was implemented with less-than-ideal fidelity (eg, limited student participation, no course credit or instructor to provide structure, feedback, and help to motivate students), which may have limited its effectiveness. In addition, we did not conduct follow-up surveys; as such, the long-term effects of the program are unknown. Despite these limitations, our findings suggest that College Alc may be an effective Web-based alcohol-misuse and harm-prevention strategy for students with a history of alcohol use.

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NOTE

For comments and further information, address correspondence to Dr. Melina Bersamin, 1995 University Ave., Berkeley, CA 94704 (e-mail: mbersamin@prev.org).

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