Alcohol prevention strategies on college campuses and student alcohol abuse and related problems

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Abstract

Background: This exploratory study examined the relationship between colleges' alcohol abuse prevention strategies, as assessed by a new rating tool developed to assess the intensity and comprehensiveness of a broad spectrum of prevention strategies on college campuses, and their students' level of alcohol abuse and related problems.

Methods: Alcohol prevention coordinators and first year students in 22 colleges reported whether their schools were implementing 48 strategies in six domains, and first-year students (N=2041) completed another survey concerning their use of alcohol and related consequences.

Results: Colleges were most likely to prohibit alcohol use in public places on campus and the delivery and use of kegs. Four of the six alcohol prevention domains assessed, namely targeted and informational strategies, alcohol free strategies, reductions in alcohol availability, and policy and enforcement, were inversely associated with at least one of five outcomes related to student alcohol abuse or related consequences. The fourth domain – alcohol policy and enforcement – was inversely associated with all five outcomes.

Conclusions: Colleges should pay particular attention to alcohol abuse prevention strategies that are related to policy and enforcement.

Keywords

alcohol abuse; prevention; environmental strategies

INTRODUCTION

Heavy alcohol use by college students remains a major public health issue. Latest statistics from Monitoring the Future suggest that as of 2008, 37% of college students had consumed five or more drinks in a row in the two week period prior to the administration of the survey, and 40% reported drinking enough to feel drunk within the past 30 days. Trend data

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collected annually since 1980 show that the prevalence of binge drinking among full-time college students has largely remained static, even as comparable trends for non-college young adults and 12th graders have manifested a reduction over time (Johnston et al., 2009). Moreover, a recent national study indicates that alcohol-related deaths among college students increased by 27%, from 1,440 in 1998 to 1,825 in 2005, and shows an increase in past 30-day binge drinking from 42% to 45% during this period (Hingson et al., 2009). This study also indicates consistently higher levels of binge drinking and related problems (e.g., drinking and driving) among college students than among youth not attending college. The stability over time of binge drinking among college students has recently been confirmed by a study that examined data from the National Survey of Drug use and Health from 1979 through 2006 (Grucza et al., 2009). It would thus appear that efforts by colleges in the United States to reduce rates of binge drinking and related problems have met with little success. This may be due in part to limitations in the comprehensiveness and effectiveness of strategies that colleges use to reduce student drinking and related problems. However, research on the extent to which colleges use recommended "best practices" for student alcohol abuse prevention is limited.

Administrators and practitioners in institutions of post-secondary education now have two resources for strategies that are designed to prevent or reduce problem drinking and related harm among college students. The first of two major resources comprises a series of strategies recommended by the National Institute of Alcohol Abuse and Alcoholism (NIAAA) Task Force on College Drinking (2005), which are ranked in four tiers based on the strength of the evidence that supported their effectiveness as of 1995. Those occupying the highest tier are limited to behavioral change strategies that target individual students, including Brief Alcohol Screening and Intervention for College Students (BASICs). As strong as the evidence appeared to be to the NIAAA Task Force, however, a recent review found that much of the supportive research for first tier strategies was characterized by a variety of methodological limitations (Larimer and Cronce, 2007). The second tier specified by NIAAA comprises environmental strategies (e.g., increased enforcement of minimum legal drinking age laws, keg registration) that have been successful or have demonstrated promise in the context of the general population, but have yet to be tested specifically for and in college environments (Toomey et al., 2007). The third tier, which also focuses on environmental changes (e.g., increased publicity about the enforcement of underage drinking laws, social norming campaigns), includes strategies that appear conceptually sound or are supported by pertinent theory, but have yet to be rigorously evaluated. Tier 4 strategies comprise informational, knowledge-based, or values clarification interventions, which NIAAA has rated as ineffective when used alone.

The Higher Education Center for Alcohol and Other Drug Abuse and Violence Prevention, supported by the Department of Education (U.S. Department of Education's Higher Education Center for Alcohol and Other Drug Abuse and Violence Prevention, 2010), has also endorsed a number of environmental management strategies. The Center suggests that colleges should develop comprehensive, campus-wide policies that send an unambiguous message to students that alcohol abuse will not be tolerated, and that policies concerning abuse will be diligently and consistently enforced. Mentioned as examples of effective policies are those that prohibit beer kegs and games relating to alcohol consumption, ensure

that alcohol-free beverages be made available at all campus functions, and require identity checks at all events at which alcohol is served. The Center also recommends strategies to reduce alcohol availability, either by banning it at all campus venues or by restricting where and when it can be consumed, including at fraternities and tailgate parties. Efforts to collaborate with the community to reduce the availability of alcohol off-campus, including promoting responsible beverage service, requiring keg registration, prohibiting specials on drinks, and reducing the density of retail alcohol outlets, can also be effective. In addition, the Center suggests that colleges should restrict the marketing and promotion of alcohol, particularly by severing any financial relationships they may have with the alcohol industry and eliminating the sales of alcohol at sporting events. Also considered effective are efforts to reduce students' often exaggerated beliefs of their peers' use of alcohol through social norms marketing campaigns, together with strategies designed to promote healthy norms concerning alcohol use, such as the provision of substance-free residence halls. These strategies also include raising academic standards and requiring Friday and Saturday classes that are sufficiently early in the day to deter heavy alcohol consumption the previous night. Finally, the Higher Education Center recommends that colleges offer a variety of substance-free social and other extra-curricular activities and venues such as coffee houses and student centers.

A recent survey of administrators at 351 four-year universities indicated that administrators are familiar with these various strategies, but only half of the schools were using evidence-based interventions for individual students and fewer were involved in empirically supported community-based alcohol control strategies such as compliance checks (33%), responsible beverage service training (15%) and restricting licensed alcohol outlets (7%; Nelson et al., 2010). Although the study by Nelson et al. (2010) provides important descriptive information that provides a basis for monitoring alcohol prevention strategies implemented by universities in the U.S., it does not attempt to rate both the intensity and comprehensiveness of these strategies, nor does it examine the extent to which ratings for alcohol strategies in various domains are related to student drinking and related consequences.

Based on the typology of effective or promising alcohol abuse prevention strategies recommended by the NIAAA Task Force and the Higher Education Center, we have developed a new rating instrument that comprises six domains, including: (1) using targeted and informational strategies, (2) changing social norms supportive of alcohol consumption, (3) creating an alcohol-free environment, (4) utilizing policy and enforcement strategies, (5) reducing alcohol availability, and (6) restricting alcohol marketing and promotion. Each domain includes a varying number of pertinent strategies drawn from those recommended by the NIAAA Task Force and the Higher Education Center, which are displayed in Table 1.

These strategies are supported by several theories of behavior and behavior change. For example, the Theory of Reasoned Action (Ajzen and Fishbein, 1980) suggests that behavioral intention is a function both of personal attitudes towards a given behavior, which in turn are shaped by information (Domain 1), and of subjective norms, or perceptions of what others think about the behavior (Domain 2). Deterrence theory (Nagin and Pogarsky, 2001) suggests that individuals will avoid negative behaviors to the extent that they perceive

related sanctions to be certain, severe, and swift (Domains 3 and 4). Domain 5 is supported by availability theory (Bruun et al., 1975; Single, 1988) which asserts that the most effective strategy to reduce excessive alcohol consumption and related harms is through restricting availability. Restricting alcohol advertising (Domain 6) may also serve to reduce student alcohol abuse by affecting their subjective norms regarding the acceptability of alcohol use and perceived availability of alcohol (e.g., happy hour advertisements).

The purpose of this paper is to describe the extent to which a broad range of alcohol prevention strategies recommended by the NIAAA Task Force and Higher Education Center as "best practices" were being implemented by a diverse sample of universities. We also explore the relationship between the level of implementation of alcohol prevention strategies in six different domains and the frequency of their students' drinking, the prevalence and frequency of binge drinking, average number of drinks consumed per occasion, and problems related to alcohol consumption. This study constitutes the first time that this instrument has been employed to describe and rate colleges' use of alcohol abuse prevention strategies, and the extent to which ratings in different domains are associated with student drinking and alcohol-related problems.

MATERIALS and METHODS

Respondents

The study utilized data that were collected by the investigators from two sets of respondents. The first comprises an alcohol prevention coordinator at each of a convenience sample of 22 colleges and universities across the United States that are participating in a study of alcohol abuse prevention strategies, including an online alcohol education course for first year students. The 22 colleges met certain eligibility criteria for the study (e.g., willingness to implement an alcohol education course, ability to provide random samples of first year students). The schools' alcohol prevention coordinators responded to a 30 minute, self-administered, mailed survey in the Fall 2008 semester in which they specified the level of implementation of alcohol problem prevention strategies at their respective campuses. Coordinators were encouraged to contact other knowledgeable university personnel as necessary to find out as much as possible about implementation of each strategy we specified. All prevention coordinators who were invited to participate in the voluntary survey did so.

The second set of respondents comprises a random sample of 2041 first-year students at the 22 participating colleges, who completed an anonymous, 15 minute web-based survey in the fall semester of 2008 (mean age = 18.4, SD=.77, range: 18–29). Random samples of approximately 200 first-year students at the 22 colleges were invited to participate in this survey. All study participants were informed that participation in the study was voluntary, that their responses to survey questions would be kept confidential, and that survey results would only be reported in the aggregate without disclosing identities of either individuals or schools.

A survey invitation letter with a $10 cashable check was mailed to all randomly sampled students in late October, and up to three e-mail reminders were also sent to those who

had not completed the survey within the next four weeks. The invitation letter and e-mail reminders explained the purpose of the study and informed students that their participation was completely voluntary and that their identity would be kept confidential. Students were instructed to log in to the survey website using a unique personal identification number. The overall student survey response rate was 48% (range: 32–68%). Non-response sample weights based on gender and race were calculated to adjust for over- or under-representation of student subgroups. These weights were then used to calculate college-level estimates of alcohol-related behaviors of interest. Although the resulting weighted samples may still be construed as non-representative convenience samples, a number of studies have demonstrated that such samples are valuable for ecological studies of this type (Nelson et al., 2005; Straus, 2009).

All study procedures were approved by the Institutional Review Board of the Pacific Institute for Research and Evaluation (PIRE), including our commitment to protect the identities of all participating colleges and survey respondents.

Instruments

Table 1 displays the rating instrument developed to describe, in six key domains, alcohol abuse prevention strategies that have been recommended for college campuses by the NIAAA College Task Force Report (NIAAA Task Force on College Drinking, 2005) and the Higher Education Center for Alcohol, Drug and Violence Prevention (U.S. Department of Education's Higher Education Center for Alcohol and Other Drug Abuse and Violence Prevention, 2010). Alcohol prevention coordinators at each participating college indicated which (if any) of these strategies their campuses had implemented, and with what degree of intensity. Prevention coordinators were offered five response options for each strategy specified in Table 1, namely: 0=not under consideration; 1=in planning stage; 2=yes, but only briefly or small-scale; 3=yes; and 4=yes, with high intensity. Responses to strategies within each domain were summed to calculate a total domain score, and an overall index that represented the sum of the ratings of all strategies across all domains was also computed. The summative score for each domain and for the overall index was then divided by the number of its respective constituent items so that rating scales would be comparable across domains.

The study utilized five measures of student drinking. *Frequency of alcohol consumption* was assessed by the following question: "In the past 30 days, on how many days would you say that you had at least one drink of beer, wine or liquor?" *Average number of drinks* was assessed with the question, "Of those last 30 days when you did drink an alcoholic beverage, on average, how many drinks did you usually have?" *Prevalence and frequency of binge drinking* were assessed by the following question: "During the past 30 days, how many times have you had 5 (or 4) or more drinks in a row within a two hour period?" The number in the question was automatically filled in on the web-based survey as either a 5 or a 4, depending on whether the respondent was male or female, respectively, which constitutes the conventional gender-specific threshold for binge drinking (Wechsler and Nelson, 2008). *Alcohol related problems* were assessed with a question with the following stem: "During the past 30 days, how often has your drinking caused you to…." The question continued

with a list of 28 problems, e.g., "have a hangover," "miss a class," "do something you later regretted," "argue with friends," "forget where you were or what you did." Response options ranged from 0=never to 6=10+ times, and were summed to create an overall alcohol problem index. For response options with a range (e.g., 3–5 times, 6–9 times), a mid-range value was used; for the final option (10+), 10 was used. The full index thus could potentially range from 0 to 280 (28 problems X 10 or more times in the past month). Copies of instruments for both the college alcohol prevention coordinators and for students are available from the first author upon request.

Data Analysis

All analyses were conducted at the college level (N=22). Descriptive statistics were first examined to assess the level of implementation of each alcohol prevention strategy specified in the rating instrument, as reported by each college's prevention coordinator. In regards to the study's second research question, we began by describing the level of alcohol use and related problems across the 22 colleges. We then examined associations between each domain-level alcohol prevention strategy rating and students' reports of alcohol use, binge drinking, and related problems. We hypothesized that each domain score, as well as the score for the overall index of strategies used, would be inversely or negatively associated with the study's various measures of students' problem drinking and related consequences. We ran a separate ordinary least squares (OLS) regression model for each dependent variable and each alcohol prevention domain rating, as well as the overall alcohol prevention rating. In these regressions we controlled for a variety of characteristics at the college level with the potential to confound the relationship between alcohol prevention strategies and levels of student alcohol abuse. These potential confounds, which were entered in each regression model as an undifferentiated block, included total number of undergraduates for each college and the percent who were white, male, living on campus, and involved in Greek organizations. We conducted t-tests to examine whether there were any associations between implementation of the online alcohol education course, ratings for alcohol prevention strategies, and alcohol-related behaviors. No significant associations were observed, and therefore we did not control for implementation of the alcohol education course in the analyses.

RESULTS

College Sample Characteristics

Of the 22 participating colleges, 12 were public and 10 were private. Eleven were located in metropolitan or suburban areas and 11 were in rural areas. Ten colleges were in the Midwestern region of the U.S., eight were in the southeast, and two were in the northeast and west. They averaged 7,713 (range = 1,159 to 23,042) undergraduate students, of whom an average of 73% (range=23% to 95%) were white. The average proportion of undergraduate students living on campus was 49% (range= 18%–95%), and an average of 12% (range: 0–39%) of students in the sample were involved in Greek organizations.

Alcohol Prevention Strategy Ratings

Table 1 displays the mean (on a scale of 0 to 4) and associated standard deviation for each of the strategies within the six alcohol prevention domains. As this table indicates, the strategies used with a high level of intensity by at least half the colleges in the sample included prohibiting alcohol use in public places, and prohibiting the delivery and use of kegs, on campus. Three strategies specified in the rating instrument were not used at all by at least two-thirds of the colleges surveyed, including working with community members to limit both the number of alcohol retail outlets near campus and the days or hours of alcohol sales, and prohibiting alcohol deliveries to campus; nor was the implementation of any of these strategies under consideration.

Table 2 indicates the mean intensity of alcohol abuse prevention strategies that participating colleges administered within each domain as well as across all domains. With one exception, scores for each domain were about, or somewhat less than, half the full potential score for the domain; "creating alcohol-free environments" was rated as 60% of the full score. Altogether, participating students had consumed alcohol on an average of three of the 30 days prior to the survey, and had engaged in binge drinking on 1.7 days over this period. Students in the sample who had used alcohol in the previous 30 days (who constituted 54% of the total sample) consumed an average of 2.1 drinks per drinking day.

Ratings of alcohol prevention strategies and student alcohol consumption and related problems

Table 3 displays beta coefficients for the college-level alcohol prevention domain scores as well as the overall index representing the strategies as considered in aggregate. The table also displays student-level alcohol-related outcomes of interest. All beta coefficients are adjusted for the potentially confounding college-level characteristics specified above. R-squared values for regression models are also included to indicate the proportion of variance in alcohol-related outcomes explained by each model. All associations between college ratings and students' alcohol-related outcomes were negative, as anticipated. The strongest associations noted were in regards to the policy and enforcement rating, which was strongly related to all five alcohol-related outcomes, and manifested a unique shared variance (or R^2) with each that ranged from .36 to .43. The domain demonstrating the second strongest set of associations comprised alcohol-free strategies, which was inversely associated with first year students' average number of drinks and the prevalence of their past 30-day binge drinking (unique R^2 = .25 and .35, respectively). The rating pertaining to targeted and informational strategies was inversely related to average number of drinks (unique R^2=.18), and the alcohol availability domain was related to the prevalence of past 30-day binge drinking (unique R^2=.17). Neither of the domains pertinent to changing the normative environment or restricting alcohol marketing was significantly associated with any of the alcohol-related outcomes. Finally, the overall alcohol prevention index was inversely associated with both the average number of drinks per occasion and prevalence of past-30-day binge drinking (unique R^2 =.24).

DISCUSSION

In this study of a convenience sample of 22 geographically heterogeneous colleges, we found that at least half administered, with high intensity, strategies designed to prohibit students' use of alcohol in public places on campus, as well as the delivery and use of kegs. Both of these policies are recommended by the Higher Education Center of the U.S. Department of Education as environmental strategies designed to limit alcohol availability. However, at least two-thirds of the colleges were not working with their communities to limit either the number of alcohol retail outlets near campus or the days and hours of alcohol sales; nor did they have any plans to do so. Our finding that strategies requiring engagement with the local community generally demonstrated the lowest level of utilization is consistent with the recent national study by Nelson et al. (2010), and suggests that many colleges may need technical assistance if they are to successfully collaborate with their communities to decrease students' alcohol abuse. Recent evaluations of environmental prevention strategies involving collaboration between campuses and communities indicate that such strategies are both feasible and effective in reducing student alcohol problems (Saltz et al., in press; Saltz et al., 2009; Weitzman et al., 2004).

Of the 22 colleges studied, only six reported that they utilized, with high intensity, brief motivational interviews to intervene with problem drinkers. This strategy has received considerable research attention. In their recent review of individually-focused drinking prevention programs targeting college students, Larimer and Cronce (Larimer and Cronce, 2007) concluded that support for the effectiveness of this approach was consistent, particularly if the strategy incorporated personalized feedback delivered either in-person or via the web. Walters and Neighbors (Walters and Neighbors, 2005) came to a similar conclusion; however, Carey and colleagues (Carey et al., 2007) suggest that face-to-face motivational interviews are superior. Regardless, it is now clear that all colleges should make this approach available for students who are identified as problem drinkers (Carey et al., 2007).

Results of regression analyses indicated that the relationship between colleges' ratings and student alcohol abuse and related problems were consistently in the expected negative direction; almost half (17 of 35) of the relationships were moderate to strong (standardized beta   −.30), and almost one-third (11 of 35) of the relationships tested were statistically significant. Of the alcohol prevention domains examined in this study, alcohol prevention policy and enforcement was the most strongly and consistently associated with all of the alcohol-related outcomes. Indeed, this domain manifested a particularly high set of unique shared variances with study outcome measures that ranged from .36 to .43. The alcohol-free strategies rating was also strongly and inversely related to heavier drinking by students. The inverse associations between the overall alcohol prevention index and two of the five alcohol-related outcomes provides further support for the combined effects of individual and environmental alcohol prevention strategies. Altogether, study findings add to the very limited research literature concerning relationships between alcohol-related outcomes and differential alcohol prevention policies across various geographical areas such as nations (Brand et al., 2007; Paschall et al., 2009) and states (Fell et al., 2008).

Limitations

Our study has at least four methodological limitations. On average, across both drinkers and non-drinkers, 53% of the students who responded to the survey in the fall of 2008 had consumed at least one drink over the past 30 days, and 32% had engaged in binge drinking. These figures may be contrasted with national prevalence statistics reported earlier, which suggest that 66% of students had used alcohol in the past 30 days, and that 40% had engaged in any binge drinking in the previous two weeks (Johnston et al., 2009). This difference is likely due to the fact that the students in our college samples were freshmen and that 99% were under the legal drinking age. It is also possible that the modest average response rate of 48% may have biased our findings, though non-response sample weights should have helped to address this problem. While these two sample-related issues are confounded, we suspect that some of the heavier drinking freshmen in survey samples may have failed to complete our survey. If so, not only may our study's external validity have been compromised, but our available power to find significant associations between college alcohol prevention strategies and the study's student alcohol-related outcomes may have been attenuated. However, as noted previously, prior studies have demonstrated the utility and value of convenience samples of college students in ecological studies to evaluate the validity of survey measures (Straus, 2009) and effects of alcohol control policies (Nelson et al., 2005).

Second, the cross-sectional nature of our study data precludes any conclusions regarding the direction of causality between college-wide alcohol prevention strategies and students' alcohol abuse and related problems. That is, higher levels implementation of these strategies may have reduced student drinking, or colleges with relatively low levels of alcohol consumption may have adopted higher levels of prevention strategies to maintain the *status quo*. It is also possible that students whose drinking habits are modest are attracted to colleges that are characterized by social norms of sobriety that reinforce those norms with higher levels of alcohol prevention strategies.

Third, the rating instrument was completed by the alcohol prevention coordinator at each participating college, as opposed to a single neutral and objective member of the evaluation staff. As such, our respondents may have differentially interpreted some of the response options we specified, particularly in the middle of the five point range. However, we have no reason to suspect any systematic social desirability bias; respondents knew that their responses were anonymous, and that we would keep the names of their institutions confidential. An additional source of response bias may be attributed to error due to prevention coordinators' limited knowledge of the level of implementation of all prevention strategies included in the rating instrument. As noted above, the coordinators were encouraged to check with other knowledgeable campus personnel if necessary to obtain the most accurate information possible about the various prevention strategies. We know, based on e-mail correspondence, that at least some of the coordinators followed our suggestion in this regard.

Fourth, our classification schema as specified in Table 1 may be considered somewhat arbitrary, although it is based in part on the typology of alcohol prevention strategies reviewed by the NIAAA Task Force and those recommended by the Higher Education

Center. We could, for instance, have created another domain with the label "working with the community," although the resulting resorting of strategies would have left many that could have been placed either there or in the two present domains of "utilize policy and enforcement strategies" and "reduce alcohol availability." By the same token, the position of at least one of the strategies specified, "increase rigor of academic programs," may seem misclassified as an effort to change the normative environment. In this case, we reasoned that greater emphasis on academic performance could be considered as generating a culture that would be incompatible with alcohol consumption. That assumption, however, could certainly be called into question by the number of academically rigorous colleges that have a reputation for tolerating or even covertly sanctioning heavy drinking. We did briefly consider conducting a factor analysis to provide some empirical basis for our classification system, but were precluded from doing so by the limited number of colleges (22) in our sample. We were unsure whether this analytic approach, even if feasible, would yield a superior classification system – just because a set of colleges was implementing one particular strategy in a given domain would not necessarily imply that they would be administering others that are conceptually related.

Conclusions

Several previous studies have taken an inventory of strategies that colleges are implementing to reduce students' alcohol abuse (Mitchell et al., 2005; Nelson et al., 2010; Wechsler et al., 2004). However, our exploratory study constitutes the first use of an instrument developed to assess the intensity and comprehensiveness of a broad spectrum of alcohol prevention strategies on college campuses and the extent to which ratings for strategies in different domains are related to students' level of alcohol abuse and related problems. The rating instrument can be used to shed light on the extent to which colleges are implementing strategies that are either supported by empirical evidence, such as motivational interviewing, or constitute current recommendations concerning best practices. Technical assistance can then be directed to those colleges that are not implementing or underutilizing these strategies. As noted earlier, college students' rates of binge drinking have remained unacceptably and consistently high for almost 30 years. The means to address this public health issue are now available, but the leadership, motivation and expertise to do so may be lacking.

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References

Ajzen I, Fishbein M (1980) Understanding attitudes and predicting social behavior. Prentice Hall, Englewood Cliffs, NJ.

Brand DA, Saisana M, Rynn LA, Pennoni F, Lowenfels AB (2007) Comparative analysis of alcohol control policies in 30 countries. PLoS Med 4:752–759.

Bruun K, Edwards G, Lumio M, Mäkelä K, Pan L, Popham RE, Room R, Schmidt W, Skog O, Sulkunen P, Österberg E (1975) Alcohol control policies in public health perspective. Vol 25. The Finnish Foundation for Alcohol Studies, Helsinki.

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Carey KB, Scott-Sheldon LA, Carey MP, DeMartini KS (2007) Individual-level interventions to reduce college student drinking: a meta-analytic review. Addict Behav 32(11):2469–2494. [PubMed: 17590277]

Fell JC, Fisher DA, Voas RB, Blackman K, Tippetts AS (2008) The relationship of underage drinking laws to reductions in drinking drivers in fatal crashes in the United States. Accid Anal Prev 40(4):1430–1440. [PubMed: 18606277]

Grucza RA, Norberg KE, Bierut LJ (2009) Binge drinking among youths and young adults in the United States: 1979–2006. J Am Acad Child Adolesc Psychiatry 48(7):692–702. [PubMed: 19465879]

Hingson RW, Wenxing Z, Weitzman ER (2009) Magnitude of and trends in alcohol-related mortality and morbidity among U.S. college students ages 18–24, 1998–2005. J Stud Alcohol Drugs suppl 16:12–20.

Johnston LD, O'Malley PM, Bachman JG, Schulenberg JE. Monitoring the Future national survey results on drug use, 1975–2008. Volume II: college students and adults ages 19–50. Bethesda, MD: National Institute on Drug Abuse; 2009. NIH Publication No. 09–7403.

Larimer ME, Cronce JM (2007) Identification, prevention, and treatment revisited: individual-focused college drinking prevention strategies 1999–2006. Addict Behav 32(11):2439–2468. [PubMed: 17604915]

Mitchell R, Toomey T, Erickson D (2005) Alcohol policies on college campuses. J Am Coll Health 53(4):149–157. [PubMed: 15663063]

Nagin DS, Pogarsky G (2001) Integrating celerity, impulsivity, and extralegal sanction threats into a model of general deterrence: theory and evidence. Criminology 39:865–891.

Nelson TF, Naimi TS, Brewer RD, Wechsler H (2005) The state sets the rate: the relationship among state-specific college binge drinking, state binge drinking rates, and selected state alcohol control policies. Am J Public Health 95:441–446. [PubMed: 15727974]

Nelson TF, Toomey TL, Lenk KM, Erickson DJ, Winters KC (2010) Implemenation of NIAAA college drinking task force recommendations: how are colleges doing 6 years later? Alcohol Clin Exp Res 34(10), epublished July 20, 2010.

NIAAA Task Force on College Drinking. A call to action: changing the culture of drinking at U.S. colleges. Available at: http://www.collegedrinkingprevention.gov/NIAAACollegeMaterials/TaskForce/TaskForce_TOC.aspx. Accessed November 4, 2010.

Paschall M, Grube J, Kypri K (2009) Alcohol control policies and alcohol consumption by youth: a multi-national study. Addiction 104:1849–1855. [PubMed: 19832785]

Saltz RF, Paschall MJ, McGaffigan RM, Nygaard PM (in press) Alcohol risk management in university settings: the Safer California Universities Project. Am J Prev Med.

Saltz RF, Welker LR, Paschall MJ, Feeney MA, Fabiano PM (2009) Evaluating a comprehensive campus-community prevention intervention to reduce alcohol-related problems in a college population. J Stud Alcohol Drugs suppl 16(16):21–27.

Single EW (1988) The availability theory of alcohol related problems, in Theories on alcoholism, (Chaudron CD, Wilkinson DA eds), pp 325–351. Addiction Research Foundation, Toronto.

Straus M (2009) The national context effect: an empirical test of the validity of cross-national research using unrepresentative samples. Cross Cultural Res 43(3):183–205.

Toomey TL, Lenk KM, Wagenaar AC (2007) Environmental policies to reduce college drinking: an update of research findings. J Stud Alcohol Drugs 68(2):208–219. [PubMed: 17286339]

U.S. Department of Education's Higher Education Center for Alcohol and Other Drug Abuse and Violence Prevention. Environmental change. [U.S. Department of Education web site]. Available at: http://www.higheredcenter.org/environmental-management/change. Accessed November 4, 2010.

Walters ST, Neighbors C (2005) Feedback interventions for college alcohol misuse: what, why and for whom? Addict Behav 30(6):1168–1182. [PubMed: 15925126]

Wechsler H, Nelson T (2008) What we have learned from the Harvard School of Public Health College Alcohol Study: focusing attention on college student alcohol consumption and the environmental conditions that promote it. J Stud Alcohol Drugs 69(4):481–490. [PubMed: 18612562]

Wechsler H, Seibring M, Liu I, Ahl M (2004) Colleges respond to student binge drinking: reducing student demand or limiting access. J Am Coll Health 52(4):159–168. [PubMed: 15018427]

Weitzman ER, Nelson TF, Lee H, Wechsler H (2004) Reducing drinking and related harms in college. Am J Prev Med 27(3):187–196. [PubMed: 15450630]

Table 1.

College campus-based alcohol problem prevention strategies (N=22)

Domain	Strategy	% Not Using Strategy	% Using Strategy with Intensity	Mean[*](SD)
Use targeted and informational strategies (9)	Formal screening for problem drinking or alcohol-related problems	9.1	18.2	2.5 (1.1)
	Brief motivational interviews for intervening with problem drinkers	13.6	27.3	2.6 (1.3)
	Provide individualized feedback on problem drinking/alcohol-related problems to individual students in personal interviews or in small groups	13.6	27.3	2.6 (1.4)
	Peer education programs	27.3	31.8	2.3 (1.6)
	Informational, knowledge-based, or values clarification interventions about alcohol use and consequences	22.7	13.6	2.2 (1.4)
	Curriculum infusion	40.9	4.5	1.4 (1.3)
	Health fairs	22.7	27.3	2.4 (1.5)
	Safe Ride program to prevent drinking & driving	40.9	13.6	1.5 (1.5)
	Designated driver program	59.1	4.5	1.0 (1.4)
Change the normative environment (3)	Conduct social norms campaign to correct misperceptions of campus alcohol use	13.6	9.1	2.0 (1.2)
	Institute more early morning classes and/or Friday exams	40.9	9.1	1.4 (1.4)
	Increase rigor of academic programs	45.5	9.1	1.4 (1.5)
Create alcohol free environments (4)	Create / promote new alcohol-free events and settings	0	36.4	3.3 (0.6)
	Promote consumption of non-alcoholic beverages at on –campus events	22.7	31.8	2.5 (1.5)
	Open or extend hours at student center, gym, or other alcohol-free settings	27.3	18.2	2.3 (1.5)
	Increase alcohol free residence units	31.8	13.6	2.0 (1.6)
Utilize policy and enforcement strategies (14)	Provide new students & their parents with info about alcohol policies & penalties	4.5	40.9	3.1 (1.0)
	Increase student disciplinary sanctions of students for alcohol related offenses	18.2	45.5	2.8 (1.5)
	Parental notification on alcohol offense	9.1	13.6	2.5 (1.1)
	Require on-campus functions to be registered	27.3	27.3	2.4 (1.6)
	Increase ID checks at on-campus functions	40.9	18.2	1.9 (1.7)
	Educate sellers & servers about potential legal liability	27.3	13.6	1.8 (1.4)
	Conduct undercover operations at local retail outlets	45.5	4.5	1.1 (1.3)
	Work with community to increase police monitoring near off- campus parties	40.9	9.1	1.3 (1.4)
	Work with community to use sobriety checkpoints to prevent alcohol-impaired driving	63.6	0	0.6 (1.0)
	Work with community to increase ID checks at local alcohol retail outlets	50	4.5	1.1 (1.3)

Domain	Strategy	% Not Using Strategy	% Using Strategy with Intensity	Mean*(SD)
	Work with community to enforce seller penalties for sale of liquor to minors	50	4.5	1.1 (1.3)
	Work with community to enforce penalties for possessing fake ID	54.5	0	0.8 (1.1)
	Work with community to impose driver's license penalties for minors violating alcohol laws	59.1	0	0.7 (1.0)
	Work with community to pass ordinances to restrict open house assemblies and noise level	54.5	4.5	1.0 (1.3)
Reduce alcohol availability (13)	Ban or severely restrict the use of alcohol on campus	31.8	27.3	2.1 (1.7)
	Prohibit alcohol use in public places on campus	18.2	50	2.9 (1.5)
	Prohibit delivery or use of kegs on campus	9.1	54.5	3.2 (1.2)
	Institute responsible beverage server training programs on campus	31.8	9.1	1.5 (1.3)
	Require use of registered and trained alcohol servers at campus pubs and on- campus functions	36.4	18.2	1.7 (1.6)
	Work with community to limit number of alcohol retail outlets near campus	72.7	4.5	0.5 (1.0)
	Require keg registration	59.1	9.1	1.0 (1.4)
	Prohibit delivery or use of kegs at fraternities & sororities	31.8	36.4	2.3 (1.8)
	Prohibit tailgating parties at sporting events	50	4.5	1.3 (1.5)
	Work with community to limit days or hours of alcohol sales	72.7	0	0.4 (0.7)
	Work with community to institute responsible beverage server training programs for local retail outlets	40.9	9.1	1.4 (1.4)
	Prohibit alcohol deliveries to campus	68.2	9.1	0.8 (1.3)
	Ban alcohol in campus stadiums	36.4	13.6	2.0 (1.6)
Restrict marketing and promotion (5)	Ban or severely restrict alcohol advertising on campus	22.7	27.3	2.3 (1.5)
	Ban or severely restrict alcohol industry sponsorship of campus events	22.7	31.8	2.5 (1.6)
	Institute cooperative agreements with bars & liquor stores to limit special drink promotions and/or establish minimum pricing	54.5	4.5	0.9 (1.2)
	Prohibit on-campus advertising of low price drink specials	36.4	22.7	1.8 (1.6)
	Ban mention of alcohol in event or party announcements on campus	13.6	31.8	2.5 (1.5)

*
Response options ranged from 0= Not under consideration to 4= Yes, with high intensity

Table 2:

Descriptive statistics for alcohol prevention domain ratings and alcohol use (N=22)

Variable	Mean (SD)	Range
Alcohol Prevention Domain		
Targeted and informational strategies	2.0 (0.9)	0.2–3.1
Change normative environment	1.6 (1.1)	0.0–3.7
Create alcohol free environments	2.4 (0.9)	0.7–4.0
Policy and enforcement strategies	1.6 (0.9)	0.2–3.0
Reduce alcohol availability	1.6 (0.6)	0.8–2.8
Restrict marketing and promotion	2.0 (1.0)	0.0–4.0
Overall alcohol prevention index	1.9 (0.6)	0.7–3.2
Alcohol Use and Problem Index		
Past-30-day alcohol use *frequency*	3.0 (1.1)	1.2–5.1
Past 30-day binge drinking *prevalence* (avg. proportion)	0.3 (0.1)	0.1–0.5
Past 30-day binge drinking *frequency*	0.9 (0.5)	0.2–1.9
Average number of drinks per drinking day	2.1 (0.8)	0.8–3.7
Alcohol problems index [*]	5.5 (2.2)	2.4–10.6

[*] Sample limited to past-30-day drinkers

Table 3:

Associations between alcohol prevention domains and students' alcohol use and related problems (N=22), unstandardized (B) and standardized (b) regression coefficients[1]

Domain	Frequency of past 30-day alcohol uses		Average # of drinks per occasion		Prevalence of past-30-day binge drinking		Frequency of past 30-day binge drinking		Alcohol problem index	
	B (SE)	b	B (SE)	b	B (SE)	b	B (SE)	b	B (SE)	b
Targeted & informational strategies	−.37 (.22)	−0.31	−.40 (.16)	−.43*	−.05 (.02)	−0.36	−.13 (.10)	−0.26	−.45 (.56)	−0.19
Model R²		0.55		0.6		0.55		0.52		0.26
Change normative environment	−.15 (.20)	−0.15	−.18 (.15)	−0.23	−.03 (.02)	−0.22	−.09 (.08)	−0.21	−.11 (.47)	−0.05
Model R²		0.49		0.5		0.48		0.5		0.23
Alcohol free strategies	−.45 (.28)	−0.35	−.49 (.20)	−.50*	−.08 (.03)	−.59**	−.17 (.12)	−0.32	−.31 (.70)	−0.12
Model R²		0.55		0.61		0.66		0.53		0.24
Policy and enforcement	−.79 (.19)	−.61**	−.62 (.15)	−.63**	−.09 (.02)	−.66**	−.35 (−.08)	−.64**	−1.48 (.52)	−.60*
Model R²		0.75		0.74		0.77		0.77		0.5
Reduce alcohol availability	−.40 (.34)	−0.23	−.50 (.25)	−0.38	−.08 (.04)	−.41*	−.20 (.14)	−0.27	−.26 (.83)	−0.08
Model R²		0.51		0.57		0.57		0.52		0.24
Restrict marketing and promotion	−.06 (.23)	−0.05	−.24 (.17)	−0.28	−.03 (.03)	−0.25	−.05 (.10)	−0.12	.14 (.54)	0.06
Model R²		0.47		0.51		0.49		0.47		0.24
Overall alcohol prevention strategies index	−.58 (.31)	−0.33	−.65 (.21)	−.49**	−.10 (.03)	−.49**	−.27 (.13)	−0.36	−.64 (.79)	−0.19
Model R²		0.57		0.66		0.65		0.58		0.26

[1] Regression coefficients are adjusted for college demographic characteristics, including total number of undergraduates, and % white, male, living on campus, and involved in Greek organizations. Statistical significance is indicated by asterisks alongside the standardized beta coefficients.

*
p< .05;

**
p<.01