Alcohol Risk Management in College Settings:

The Safer California Universities Randomized Trial

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Abstract

Context—Potentially effective environmental strategies have been recommended to reduce heavy alcohol use among college students. However, studies to date on environmental prevention strategies are few in number and have been limited by their non-experimental designs, inadequate sample sizes, and lack of attention to settings where the majority of heavy drinking events occur.

Purpose—To determine whether environmental prevention strategies targeting off-campus settings would reduce the likelihood and incidence of student intoxication at those settings.

Design—The Safer California Universities study involved 14 large public universities, half of which were randomly assigned to the Safer intervention condition after baseline data collection in 2003. Environmental interventions took place in 2005 and 2006 after 1 year of planning with 7 Safer intervention universities. Random cross-sectional samples of undergraduates completed online surveys in four consecutive fall semesters (2003–2006).

Setting/participants—Campuses and communities surrounding 8 campuses of the University of California and 6 in the California State University system were utilized. The study used random samples of undergraduates (~500–1,000 per campus per year) attending the 14 public California universities.

Intervention—Safer environmental interventions included nuisance party enforcement operations, minor decoy operations, DUI checkpoints, social host ordinances, and use of campus and local media to increase the visibility of environmental strategies.

Main outcome measures—Proportion of drinking occasions in which students drank to intoxication at six different settings during the fall semester (residence hall party, campus event, fraternity or sorority party, party at off-campus apartment or house, bar/restaurant, outdoor setting), any intoxication at each setting during the semester, and whether students drank to intoxication the last time they went to each setting.

Results—Significant reductions in the incidence and likelihood of intoxication at off-campus parties and bars/restaurants were observed for Safer intervention universities compared to controls. A lower likelihood of intoxication was also observed for Safer intervention universities the last time students drank at an off-campus party (OR=0.81, 95% CI=0.68, 0.97), a bar or restaurant

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(OR=0.76, 95% CI=0.62, 0.94), or any setting (OR=0.80, 95% CI=0.65, 0.97). No increase in intoxication (e.g., displacement) appeared in other settings. Furthermore, stronger intervention effects were achieved at Safer universities with the highest level of implementation.

Conclusions—Environmental prevention strategies targeting settings where the majority of heavy drinking events occur appear to be effective in reducing the incidence and likelihood of intoxication among college students.

Introduction

There are over 1800 alcohol-related deaths each year among college students,[1] yet the negative effects related to college student drinking extend far beyond this figure to include: 590,000 unintentional injuries; more than 690,000 assaulted by another student; more than 97,000 victims of sexual assault or date rape; and about 25% reporting negative academic consequences. These estimates were a primary motive for the National Institute on Alcohol Abuse and Alcoholism (NIAAA) to form a national task force to address college student drinking.[2] In reviewing the research on college student drinking, however, the task force noted that studies done among college populations were limited largely to prevention aimed at individuals. Given the demonstrated efficacy of universal prevention strategies in general populations,[3−5] the task force strongly encouraged NIAAA and the research community to conduct studies that would evaluate the impact of universal strategies in the college setting. Three community interventions were singled out as successful examples for college settings: [6] The Massachusetts Saving Lives program, [3] Communities Mobilizing for Change on Alcohol (CMCA),[5, 7, 8] and the Community Trials Project.[4]

Since the task force report was issued, a few multicomponent community-based college interventions have been reported.[9] One of the better studies was an evaluation of the American Medical Association's "A Matter of Degree" program[10] that compared a comprehensive environmental community intervention at ten schools with a high prevalence of heavy drinking with 32 similar campuses. Although no significant reduction in drinking was found between the intervention and comparison schools, there were significantly lower levels of heavy drinking and alcohol-related negative consequences among a subset of five campuses that implemented the program with greater intensity. Additional studies of community-level interventions have reduced self-reported driving under the influence,[11] increased student support for anti–drunk-driving policies,[12] and reduced the prevalence of intoxication at off-campus parties proximal to the campus.[13]

In their review of environmental and policy interventions in college settings, Toomey and her colleagues[9] were disappointed with the quantity and quality of research to date. They conclude, "Future studies should continue to assess specific and multi-strategy environmental approaches, using randomized controlled trials or controlled time-series designs that are large enough to allow an assessment of causal effects." This is the need that the Safer California Universities Project was designed to address. The hypothesis is that implementing a multicomponent environmental prevention intervention will reduce intoxication at the targeted settings.

Methods

Design

The Safer California Universities study was designed to test the efficacy of a community-based environmental alcohol risk management prevention strategy applied to college campuses. The study used a control group, randomized experimental design involving 14 sites—8 campuses from the University of California (UC) and 6 campuses from the

California State University (CSU) systems. Campuses were matched within university system based on drinking data from the baseline surveys. A random lottery determined which campus of each pair would be the intervention site, or as control. Figure 1 summarizes the study design. IRB approval was given on July 16, 2001. Funding was provided by the National Institute on Alcohol Abuse and Alcoholism (NIAAA) with supplemental funding from the Substance Abuse and Mental Health Administration (SAMHSA).

Intervention

The intervention's design was largely built on the successful Community Trials Project.[4] The objective was to combine elements of population-level alcohol control based on the general principles of deterrence[14,15] and reduced availability of alcohol[5] in order to obtain a synergy sufficient to achieve a measurable reduction in risky drinking and subsequent harm. The question was whether this approach could be transferred from general populations to college communities.

In the planning phase of the intervention, student survey data showed the relative magnitude of problems across settings. All experimental campuses subsequently chose to focus on off-campus parties, including Greek houses where they existed.

Planning groups were then given specific components from those recommended by the NIAAA task force, or by the IOM's report "Reducing Underage Drinking: A Collective Responsibility".[16] The intervention consisted of a set of alcohol control measures coupled with heavy publicity to give visibility to those enforcement activities. The enforcement combined (1) roadside DUI checks; (2) police compliance check operations using underage decoys to enforce laws prohibiting sales to minors; and (3) designated "party patrols" that would enforce local and state laws regarding provision of alcohol to minors or disturbing the peace. The objective was to implement any combination of 9 operations within the first 8–10 weeks of school. These operations were to be amplified by the use of local media reports and events to publicize the operations. Six different channels of communication (e.g., website; brochure; e-mails; newspaper pieces) were designated to achieve visibility. In addition, each site was asked to push for a so-called "response cost" ordinance, that would subject party hosts to an additional fine if police cited the same address twice or more within a window of time (e.g., 180 days).

These components were hypothesized to work synergistically via deterrence and reduced availability. The deterrence effect would apply to reducing retail sales of alcohol to not only minors and drinking drivers, but also potential hosts of private parties. The aim was to encourage hosts to exercise more control over their guests (e.g., by reducing the number of invitations, lowering noise, and curtailing obnoxious behavior) and also encouraging guests to reign in their own behavior and cooperate with the hosts. Although fewer than 10% of students reported driving while having too much to drink (or riding with someone who had), DUI enforcement was included in the mix to gain visibility for alcohol controls directly, and because students give DUI prevention high legitimacy.[12] A mix of targets for deterrence also helps overcome any one group's feeling unfairly targeted by enforcement.

At the same time, the intervention was intended to reduce the commercial sales to underage students, but also to reduce the number and size of private parties. Potential hosts may decide against throwing large parties, leaving fewer given, and thus, lower the social availability of alcohol.

Intervention campuses differed in their level of implementation. One campus was unable to take on the implementation at all, but is nevertheless included as an intervention site in all

the analyses reported here based on an "intent to treat" evaluation. In the first year of intervention, the range of DUI enforcement operations was 0 to 3 with a mean of 1.4. For decoy operations, the numbers were 0 to 5 and 2.4, and for party patrols, the range was 0 to 10 and a mean of 3.7. In the second year of intervention, there was a range of 0 to 3 DUI operations with a mean of 2, for decoy operations, a range of 0 to 5 with a mean of 2.1, and for party patrols, a range of 0 to 28 with a mean of 9.3 and median of 4.

On the side of publicity or visibility, the average number of campus news items for the 2 intervention years was 7.5 and 7.2, and dedicated websites grew from 3 to 5 campuses over the 2 years. All campuses but one had created a brochure focused on enforcement in the first year and continued into the second.

A major challenge for comprehensive, community prevention interventions is to maintain focus and to coordinate resources within a specific time frame. With college student drinking problems, there is research evidence,[17] that suggests problems are greater and more prevalent in the first weeks of the school year. Having a fixed deadline (first day of school) was a key advantage for accelerating implementation and maintaining focus.

Very specific direction was provided for planning through implementation, including specifying content for three planning meetings and three to five implementation meetings. The objective was having less discussion of what to do and much more on how to get it done. Follow-up interviews with liaisons showed that providing detailed instructions was appreciated (with minor exceptions).[18]

Student surveys

Survey data were collected from random cross-sectional samples of undergraduate students attending the 14 California universities in four consecutive fall semesters or quarters from 2003 to 2006. Random samples of 2,000 students per school were initially targeted for surveys in fall 2003 followed by 1,000 per school in subsequent years. A pre-notification letter with a cashable $10 check was first sent via U.S. mail to inform each sampled student about the study. An e-mail invitation followed with a URL that each student could click on to go to a website that hosted the survey. Two e-mail reminders were sent to students who had not completed the online survey 3 to 7 days after the first e-mail contact. On average, the questionnaire took approximately 25 minutes to complete.

Measures

Intoxication at settings/events: Students were asked whether and how often they went to each of six settings where alcohol use may occur since the beginning of the semester (an average of 9.8 weeks before they completed the questionnaire), including a fraternity or sorority ("Greek") party, a residence hall ("dorm") party, a campus event (e.g., football game), a party at an off-campus house or apartment, a bar/restaurant, and an outdoor setting (e.g., public park). Based on the number of times students reported going to a particular setting, they were asked how many of those times they drank alcohol, and of the times they drank alcohol at the setting, how many times they drank enough to get drunk. They were also asked whether they drank enough alcohol to get drunk the last time they went to the setting.

Responses were used to compute the proportion of times at each setting students drank enough alcohol to get drunk and to also create dichotomous (0=no, 1=yes) measures indicating whether students drank enough alcohol to get drunk on *any occasions* at each setting or at any of the settings, and whether students got drunk the *last time* they went to each setting or the last time they went to any of the settings.

Alcohol use in past year and heavy episodic drinking: Students were asked how often they consumed any type of alcoholic beverage in the past 12 months, with eight possible response options ranging from "never had a drink of alcohol" to "once a day or more". They were also asked how often in the past 2 weeks they consumed five or more consecutive drinks (men) or four or more consecutive drinks (women) in a row. Six possible response options ranged from "never" to "10 or more times".

Alcohol expectancies: Respondents were asked, "How likely is it that each of the following things would happen to you personally if you were to drink three or four alcoholic beverages?" There were nine possible positive consequences (e.g., "feel relaxed," "feel happy," "feel more confident or sure of yourself") and nine possible negative consequences (e.g., "get a hangover," "get into trouble with police," "do something you'd later regret") with four response options ("very likely," "somewhat likely," "somewhat unlikely," "very unlikely") and corresponding values ranging from 1 to 4. After reverse coding some items, summative scores were computed for positive and negative expectancies (Cronbach alpha = .90 for both measures).

Religiosity: Students were asked, "How religious are you?" with four possible responses ("very," "somewhat," "a little," "not at all") and corresponding values ranging from 1 to 4. A higher value represented a higher level of religiosity.

Grade point average: Respondents were asked to report their cumulative GPA since they matriculated to the university.

Health indicators: Students were asked to report their general health status, with responses ranging from "poor" (1) to "excellent" (4), and also report their weight.

Sociodemographic characteristics: Respondents reported their age (treated here as an aged <21 years vs aged ≥21 years dichotomy), gender, race/ethnicity (treated here as a white vs nonwhite dichotomy), academic status or class (freshman, sophomore, junior vs senior), place of residence (house/apartment, fraternity or sorority house, student cooperative housing vs residence hall), marital status (married vs single), employment status (part- or full-time vs unemployed), Greek organization membership (yes/no), whether they were involved in intramural or intercollegiate athletics (yes/no), whether they had a motorized vehicle at school (yes/no), and whether they spent most of their weekends on or near campus (yes/no).

University characteristics: University-level characteristics included study experimental condition (Safer Intervention Condition vs Control), whether the school was in the University of California versus California State University system, percentage of students of non-Hispanic white race/ethnicity in 2003, percentage of students living on-campus in 2003, percentage of students in a fraternity or sorority in 2003, percentage of students who reported heavy episodic drinking (4+ consecutive drinks within 2 hours for women/5+ for men) on one or more occasions in the past 2 weeks in 2003, and whether the university was within 80 miles of a large metropolitan area (yes/no).

Data structure and analysis

All four waves of cross-sectional survey data were included in a single student-level data set with a survey year (Time) variable representing 2003–2004 baseline and 2005–2006 intervention implementation years. A university-level data set was also created for multilevel analyses in HLM version 6.02 software.[19] The two data sets were linked by university identifiers. Descriptive analyses (chi-square tests) were conducted to compare

unadjusted baseline outcome measures and other student and university characteristics. These analyses were conducted in SUDAAN version 9.01 software[20] to adjust for sample weighting and clustering of student observations within each university. All student- and university-level covariates were included in subsequent multilevel regression analyses to rule out confounding and maximize the precision of Time × Intervention Condition effects.

Multilevel logistic and linear regression analyses were conducted to examine the effects of intervention condition on outcome slopes for dichotomous and continuous dependent variables, respectively. The general models and formal details may be found in Appendixes A and B (available online at www.ajpm-online.net). HLM software provided adjustment for variance in outcomes that is attributable to clustering of student observations within universities.[19] Intraclass correlation coefficients (ICCs) for the outcomes ranged from .01 to .05 (M=0.03).

Results

The overall survey response level and range of school response levels for each year were 50% (range 37%–64%) in 2003, 44% (range 33%–53%) in 2004, 41% (range 33%–55%) in 2005, and 39% (range 32%–46%) in 2006. Most important, response levels were similar across the 4 years for groups of schools in each study condition. The relative ranking of each school's response level also was consistent across the 4 years. Response levels were likely affected by the short time the survey was in the field (about 4 weeks). Post hoc sample weights for each university were developed based on the gender and racial/ethnic composition of the target sample at each university relative to the gender and racial/ethnic composition of survey respondents from each university.

Descriptive baseline comparisons

Results of descriptive analyses are provided in Table 1. Schools in the intervention and control groups did not differ significantly on any of the background student characteristics, including age, gender, martial status, class composition, place of residence, and extracurricular activities. The relatively larger percentages of juniors and seniors (as compared to freshmen and sophomores) in the sample reflect students transferring from junior colleges into the UC system in their junior and senior years.

Intervention and control groups were also similar on all of the baseline outcome variables, as indicated in the bottom portion of Table 1. At least half of the students who went to a fraternity/sorority (Greek) or off-campus party reported getting drunk at those settings at least once during the fall semester, while at least 40% reported doing so at a residence hall party or bar/restaurant. On average, students reported getting drunk at about one third of the Greek and off-campus parties they attended, and about 30% of the residence hall parties and occasions at bars/restaurants.

Multilevel regression analyses

Intervention effects on relative risk of intoxication the *last time* students went to each setting are represented by ORs for the Time × Condition term in Table 2. ORs < 1.0 generally indicated a relative reduction in risk of intoxication for most of the settings, with significant reductions for the last time at an off-campus party (OR=0.81, p<.05), bar/restaurant (OR=0.76, p<.05), and any of the settings (OR=0.80, p<.05).

Some of the student covariates were consistently associated in the expected directions with getting drunk the last time at each setting (e.g., white race/ethnicity, living in a fraternity/ sorority house, Greek organization membership, positive and negative alcohol expectancies, religiosity, GPA), while others were inconsistently associated with these outcomes. At the

university level, the prevalence of heavy episodic drinking was consistently and positively associated with risk of intoxication at the settings, while being located ≥ 80 miles from a large metropolitan area was inversely related to these outcomes in the presence of other university covariates.

Multilevel models with the same student- and university-level covariates were also run for any intoxication during the semester at each setting and proportion of occasions at each setting that students drank to intoxication. Results of these analyses were consistent with findings reported in Table 2, and are summarized in Table 3.

Though not shown here, an examination was made of whether there was any displacement of drinking as a result of the intervention efforts (i.e., "chasing" the drinking to some other setting). There was no change in drinking settings (e.g., to an outdoor setting). In addition, further analyses revealed significant differences in intervention effects based on the level of intervention implementation. Where implementation was at its highest level, so was the relative reduction in intoxication. At the lowest level of implementation (in fact, actually "no" intervention) there was no difference from the comparison sites. Figure 2 illustrates the nature of the observed Time × Intervention effects on risk of intoxication the last time at targeted settings. Note that percentages in Figure 2 are adjusted for all model covariates.

Practical significance of the Safer intervention effects

Relative reductions in risk of intoxication the *last time* at each setting were 9% for an off-campus party, and 15% for a bar/restaurant, and 6% for any setting. Relative percentage reductions were similar for any intoxication and proportion of times drunk at the settings during the semester. Substituting mean values into the full HLM models, these relative reductions translated into approximately 900 fewer students/university drinking to intoxication at off-campus parties and 600 fewer students/university getting drunk at bars/restaurants during the fall semester at Safer intervention schools relative to controls. Based on the average frequency that students went to these settings (M=6.8 for off-campus parties, M=6.6 for bars/restaurants), there were approximately 6,000 fewer incidents of intoxication/university at off-campus parties and 4,000 fewer incidents of intoxication/university at bars/restaurants during the fall semester at Safer intervention schools relative to controls.

Discussion

The results support the conclusion that the comprehensive intervention was able to reduce the likelihood of intoxication at social gatherings in private homes off-campus. Where fraternity and sorority houses are part of the off-campus environment, there is evidence that the intervention had an impact there, too. Given that the intervention specifically targeted alcohol licensees (via an enforcement campaign against selling to minors), there was also a drop in intoxication in those settings. Seeing no similar impact in other settings (e.g., campus events, residence halls) boosts confidence that the impact was indeed tied to the intervention.

Nearly as notable is finding no concomitant increase in drinking at nontargeted settings. Some fear that more rigorous alcohol control measures will merely drive college student drinking to other, presumably more dangerous, settings, but that was not the case here. Future intervention studies may establish whether the concern for displacement is misplaced.

These findings should give college administrators some degree of optimism that student drinking is amenable to a combination of well-chosen, evidence-based universal prevention strategies. Here, one set of alcohol control strategies was found to be efficacious, but other

combinations may work as well, or even better. With a growing body of such evidence, and combined with strategies already shown to be effective, it will be possible to craft a comprehensive prevention program that ratchets down the harm currently produced by alcohol use on and near college campuses.

The success of this intervention lies in the choice of prevention strategies, but was also dependent on the ability of campus prevention specialists to translate the concept into concrete action. Their ability to do so depended on their training, experience, and skill in mobilizing both university and community departments and stakeholders. They provided many suggestions for overcoming potential and actual obstacles. Implementation per se has been largely ignored by the research community, despite its centrality to conducting efficacy studies. It is highly doubtful that the results here could have been achieved without the campus partners' willingness to commit to the intervention, even as it raised new and difficult problems for them. For the research community, much more work is needed to identify the implementation tactics and strategies employed by campus personnel that are sufficient, or even necessary to duplicate the effects reported here.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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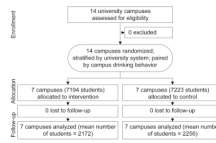
Figure 1.
Flow of clusters (university campuses) through the group-randomized prevention trial.
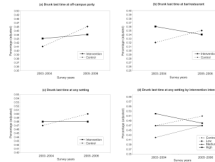
Figure 2.
Trends in percentage of students who reported getting drunk the last time they went to (a) an off-campus party, (b) a bar/restaurant, and (c) any setting, by time and intervention condition; and (d) last time at any setting by time by intervention intensity. Percentages are adjusted for model covariates indicated in Table 2. All differences in slopes are significant (see Table 2).

Table 1

Baseline student characteristics by intervention condition

Variable	14 Universities (N=19,791)	7 Intervention schools (*n*=9,732)	7 Control schools (*n*=10,059)
Demographics			
Aged <21 years (%)	53.1	50.6	55.6
Male, %	45.0	43.4	46.6
White, %	49.1	49.1	49.1
Married, %	5.3	6.3	4.4
Class			
Freshman, %	20.2	19.5	20.8
Sophomore, %	17.7	16.9	18.4
Junior, %	29.0	27.7	30.3
Senior, %	33.1	35.9	30.5
Place of residence			
House/apartment, %	76.3	77.7	74.9
Residence hall, %	20.9	19.1	22.8
Fraternity/sorority house, %	1.6	1.5	1.7
Other, %	1.2	1.7	0.6
Extracurricular activities			
Employed part-/full-time, %	51.8	50.5	53.0
Greek organization member, %	8.6	8.3	9.0
Athlete, %	15.9	14.4	17.3
Intoxication at settings during semester[a]			
Any fraternity/sorority (Greek) parties, %	57.3	56.7	57.9
Last fraternity/sorority (Greek) party, %	46.6	45.9	47.2
% of Greek parties got drunk, M (SD)	0.34 (.40)	0.34 (.40)	0.35 (.40)
Any residence hall (dorm) parties, %	49.5	49.6	49.4
Last residence hall (dorm) party, %	37.1	37.2	37.0
% of dorm parties got drunk, M (SD)	0.31 (.40)	0.31 (.40)	0.31 (.40)
Any campus events, %	26.8	26.4	27.2
Last campus event, %	19.7	19.3	20.0
% of campus events got drunk, M (SD)	0.17 (.35)	0.16 (.33)	0.18 (.36)
Any off-campus parties, %	55.4	56.4	54.4
Last off-campus party, %	42.2	43.4	41.1
% of off-campus parties got drunk, M (SD)	0.34 (.39)	0.35 (.39)	0.33 (.38)
Any occasions at bar/restaurant, %	46.9	48.6	45.2
Last time at bar/restaurant, %	33.2	35.2	31.0
% of times at bar/restaurant got drunk, M (SD)	0.28 (.38)	0.30 (.38)	0.27 (.37)
Any occasions at outdoor settings, %	31.6	33.7	29.8
Last time at outdoor setting, %	22.3	23.0	21.7
% of times at outdoor setting got drunk, M (SD)	0.22 (.39)	0.24 (.40)	0.22 (.38)

Variable	14 Universities (N=19,791)	7 Intervention schools (*n*=9,732)	7 Control schools (*n*=10,059)
Any occasions at any setting, %	57.1	57.5	56.8
Last time at any setting, %	47.6	48.2	47.0
% of times at all settings got drunk, M (SD)	0.28 (.34)	0.29 (.34)	0.28 (.34)

[a]Based on students who provided complete data for background variables and responded to initial questions about each setting (n_1) and/or subsequent questions about the last time at each setting (n_2) in baseline survey years: fraternity/sorority party (n_1=5,211, n_2=5,181), residence hall party (n_1=4,047, n_2=3,998), campus event (n_1=3,289, n_2=3,280), off-campus party (n_1=13,232, n_2=13,126), bar/restaurant (n_1=7,239, n_2=7,210), outdoor setting (n_1=3,273, n_2=3,263), any setting (n_1=15,997, n_2=15,857).

Table 2

Multilevel logistic regression models predicting risk of intoxication last time at each setting, OR (95% CI)

Predictor	Greek party	Dorm party	Campus event	Off-campus party	Bar/restaurant	Outdoors	Any setting
Time × Condition	0.86 (0.58, 1.26)	0.93 (0.59, 1.47)	0.89 (0.59, 1.34)	0.81 (0.68, 0.97)	0.76 (0.62, 0.94)	1.13 (0.56, 2.27)	0.80 (0.65, 0.97)
Intervention group	1.15 (0.73, 1.82)	0.92 (0.52, 1.65)	0.90 (0.50, 1.64)	1.29 (0.99, 1.69)	1.66 (1.13, 2.46)	0.86 (0.33, 2.23)	1.30 (0.99, 1.72)
Control group (ref)	—	—	—	—	—	—	—
Time (survey years)							
2005–2006 (intervention)	1.27 (0.97, 1.66)	1.24 (0.91, 1.69)	1.46 (1.12, 1.90)	1.28 (1.14, 1.45)	1.17 (1.01, 1.36)	0.50 (0.31, 0.82)	1.24 (1.07, 1.42)
2003–2004 (baseline, ref)	—	—	—	—	—	—	—
Student covariates[a]							
University covariates							
UC vs CSU system	0.84 (0.59, 1.18)	1.25 (0.85, 1.84)	0.72 (0.48, 1.10)	1.00 (0.84, 1.19)	0.63 (0.40, 0.99)	0.74 (0.39, 1.40)	0.89 (0.76, 1.05)
% white	1.00 (0.99, 1.02)	1.01 (0.99, 1.03)	0.99 (0.97, 1.01)	1.00 (0.99, 1.01)	1.00 (0.99, 1.02)	1.01 (0.99, 1.04)	1.00 (0.99, 1.01)
% living on campus	0.99 (0.97, 1.00)	0.99 (0.97, 1.00)	1.01 (0.99, 1.02)	1.00 (0.99, 1.01)	1.02 (1.00, 1.04)	1.00 (0.98, 1.03)	1.00 (0.99, 1.01)
% Greek members	1.08 (1.03, 1.12)	0.99 (0.95, 1.03)	1.01 (0.96, 1.06)	1.00 (0.98, 1.02)	1.00 (0.95, 1.06)	0.98 (0.91, 1.05)	1.01 (0.99, 1.03)
% heavy episodic drinking	5.39 (1.77, 16.43)	3.29 (0.83, 12.9)	6.10 (1.59, 23.4)	3.24 (1.83, 5.74)	2.71 (0.58, 12.69)	3.36 (0.42, 26.8)	4.06 (2.34, 6.94)
≥ 80 mi. from lg. city	0.35 (0.18, 0.67)	0.45 (0.23, 0.88)	0.60 (0.29, 1.24)	0.64 (0.46, 0.89)	0.90 (0.36, 2.25)	0.60 (0.18, 2.00)	0.60 (0.44, 0.81)

[a]The full model (too large to include here) includes 25 student-level covariates. The complete table is provided in Appendix B (available online at www.ajpm-online.net).

Table 3

Summary of Safer intervention (Time × Condition) effects on risk of intoxication at each setting[a]

Setting	Logistic regression OR (95% CI)		Linear regression beta coefficient (SE)
	Drunk at setting at least once during semester	**Drunk last time at setting**	**Proportion of times at setting got drunk**
Greek party	1.05 (0.63, 1.74)	0.86 (0.58, 1.26)	.001 (.03)
Dorm party	1.05 (0.67, 1.65)	0.93 (0.59, 1.47)	.04 (.04)
Campus event	0.98 (0.67, 1.46)	0.89 (0.59, 1.34)	−.01 (.03)
Off-campus party	0.74 (0.62, 0.89)[**]	0.81 (0.68, 0.97)[*]	−.04 (.01)[*]
Bar/restaurant	0.76 (0.58, 0.98)[*]	0.76 (0.62, 0.94)[*]	−.04 (.02)[*]
Outdoor setting	0.90 (0.66, 1.22)	1.13 (0.56, 2.27)	−.02 (.02)
Any setting	0.83 (0.69, 0.99)[*]	0.80 (0.65, 0.97)[*]	−.03 (.01)[*]

[*] $p < 0.05$,

[**] $p < 0.01$

[a] All multilevel regression models included covariates specified in Table 2.