

A Successful Social Norms Campaign to Reduce Alcohol Misuse Among College Student-Athletes*

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ABSTRACT. Objective: This study examines the impact of a social norms intervention to reduce alcohol misuse among student-athletes. The intervention was designed to reduce harmful misperceptions of peer norms and, in turn, reduce personal risk. **Method:** A comprehensive set of interventions communicating accurate local norms regarding alcohol use targeted student-athletes at an undergraduate college. An anonymous survey of all student-athletes was conducted annually for 3 years (2001: $n = 414$, 86% response; 2002: $n = 373$, 85% response; and 2003: $n = 353$, 79% response). A pre/post comparison of student-athletes was conducted separately for new and ongoing athletes at each time point to isolate any general time period effects from intervention effects. A cross-sectional analysis of student-athletes with varying degrees of program exposure was also performed. **Results:** The intervention substantially reduced misperceptions of frequent alcohol consumption and

high-quantity social drinking as the norm among student-athlete peers. During this same time period, frequent personal consumption, high-quantity consumption, high estimated peak blood alcohol concentrations during social drinking, and negative consequences all declined by 30% or more among ongoing student-athletes after program exposure. In contrast, no significant differences across time were seen for new student-athletes each year with low program exposure. Among student-athletes with the highest level of program exposure, indications of personal misuse were at least 50% less likely on each measure when compared with student-athletes with the lowest level of program exposure. **Conclusions:** This social norms intervention was highly effective in reducing alcohol misuse in this high-risk collegiate subpopulation by intensively delivering data-based messages about actual peer norms through multiple communication venues. (*J. Stud. Alcohol* 67: 880-889, 2006)

THERE CAN BE LITTLE DOUBT that heavy alcohol consumption on college campuses and its many negative effects constitute one of the most persistent and challenging problems facing most institutions of higher education (Perkins, 2002a). Identifying high-risk groups among students and developing programs that specifically target them have been an important concern for prevention initiatives in higher education. Student-athletes, in particular, have been identified as an important target group for prevention of alcohol misuse. Nationwide survey data have revealed significantly higher rates of heavy drinking among intercollegiate athletes compared with other undergraduates (Leichliter et al., 1998; Nelson et al., 2001; Wechsler et al., 1997). Moreover, research has shown that college students who participated in high school athletics consume alcohol more frequently and in greater quantities than those who did not participate (Hildebrand et al., 2001). Most strategies designed to prevent high-risk drinking among student-athletes, however, have had little or no positive effect or have not been able to demonstrate impact with sufficient

program evaluation (Marcello et al., 1989; Tricker et al., 1996).

The concern about collegiate student-athlete drinking goes beyond this subgroup's higher incidence levels of problem drinking. The influence of alcohol on the physical and mental demands of athletic performance has been well documented in the literature (Gutgesell and Canterbury, 1999; Stainback, 1997). In addition to significant psychomotor performance impairment, dehydration and vascular dilation caused by alcohol use increase health risks for athletes in particular (American College of Sports Medicine, 1982; Herbert, 1983). Furthermore, alcohol's ability to reduce muscle protein synthesis can limit the efficacy of an athlete's training program (Cunningham et al., 2001; Urbano-Marquez, 1989, 1995). All of these factors clearly indicate that alcohol increases health and injury risk to athletes in training and provide further arguments for the importance of developing effective programs to reduce alcohol misuse.

A large body of theory and research on antecedents of health-related behaviors and risk-taking has accumulated across several decades pointing to the importance of peer influence and group norms. The theory of reasoned action (Ajzen and Fishbein, 1980) and its extension, the theory of planned behavior, for example, posit subjective or perceived norms as a key determinant along with personal attitudes and perceived behavioral control in predicting personal behavior. Extensive evidence has supported this model, with

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subjective norms playing a greater or lesser predictive role along with attitudes and perceived control depending on the particular behavior and context (Ajzen, 2001, 2002; Ajzen and Madden, 1986). Concerning alcohol use in college populations, research has demonstrated a very strong association between perceived norms and personal drinking behavior (Perkins and Wechsler, 1996; Perkins et al., 2005). Extensive research has also documented the existence of pervasive misperceptions about drinking norms, however, on college campuses nationwide (Perkins et al., 1999, 2005). Subjective norms are most often erroneous. Students typically believe that campus norms are more permissive than is really the case among peers, even in circumstances where actual levels of use are quite high. These exaggerated perceptions contribute significantly to the problem of alcohol misuse on campus (Perkins et al., 2005).

Social norms theory predicts that by reducing misperceptions and increasing the proportion of students with more accurate information about existing healthy norms, occurrences of alcohol misuse will decrease. This prevention approach has shown positive impact in several studies of collegiate populations in general (Berkowitz, 2005; Perkins, 2002b, 2003).

Subpopulations of students will typically misperceive the campus norm in an exaggerated direction consistent with the overall pattern, and members of subgroups will tend to hold exaggerated perceptions of the drinking norms within their own subgroup (Perkins, 1997). This pattern applies to student-athletes as well (Thombs, 2000). Thus, a significant proportion of the high-risk drinking that does occur among student-athletes may be generated and perpetuated by their inaccurate perceptions about what is normative, as they think that heavy drinking is far more pervasive than is actually the case, even in this higher-risk subpopulation.

Effective social norms programs have targeted specific subpopulations (e.g., first-year students, residence-hall residents, and fraternity and sorority members) within the campus environment by employing media campaigns (Mattern and Neighbors, 2004), peer-based programming efforts (Cimini et al., 2002), and computer-delivered normative feedback (Neighbors et al., 2004). One intervention study with student-athletes, however, using a social norms approach could not find a significant difference in personal alcohol use between those who recalled campaign messages compared with an "unexposed" group (Thombs et al., 2002). Perceptions of norms for student-athletes in general and for teammates specifically were more accurate among the exposed group, but no difference in the perception of close friend norms was found. The author suggests one explanation for the lack of effect on personal drinking may come from the greater influence of close friends, some of whom are not student-athletes, coupled with the campaign's inability to impact the perception of close friends. Two thirds of respondents in that study reported, however, that their

"closest friends" were student-athletes at their institution; therefore, the lack of change in perception of close friends may have been reflecting a lack of impact on the perception of one's most immediate student-athlete peers as well. Also, that study had neither a randomized control group nor a baseline pretest comparison. It had to rely on a cross-sectional comparison of students who recalled campaign messages with a group of those who did not recall the messages at the same school mixed with all student-athletes from two other schools, all of whom in the latter category were not exposed to the campaign.

The current study sought to create a comprehensive integrated initiative to reduce harmful misperceptions about student-athlete alcohol norms by developing several simultaneous strategies for intensively communicating accurate norms about college student-athletes. The study provides a longitudinal pre/post intervention assessment as well as an assessment by level of exposure. The goal was to provide a more realistic awareness of moderate peer norms regarding drinking and disapproval of alcohol misuse. It was hypothesized that with exposure to accurate norms, perceptions of drinking norms of friends, teammates, and student-athletes in general would become less exaggerated and a significant reduction in personal alcohol misuse would be the result in the student-athlete population.

Method

This study provides a pretest/posttest comparison of student-athletes before and after a comprehensive set of interventions targeting student-athletes was introduced to reduce misperceived norms about peer drinking at one institution of higher education. Results are based on survey data collected between Fall 2001 and Fall 2003. Without a comparable control site school providing a comparable athletic program and without the ability to assign student-athletes randomly to intervention or control circumstances, it can be argued that any change observed might be the result of changes occurring in the environmental context of the student body in general. Thus, pre/post changes in perceived norms of both peer athletes and peer nonathletes are examined. Any pre/post changes could also be the result of initiatives other than the social norms intervention targeting student-athletes in particular. To address this concern, an examination of pre/post changes in student-athletes with low program exposure at each time period provides an additional control for extraneous environmental effects, as does a post-intervention cross-sectional comparison of student-athletes with varying degrees of exposure.

Data collection

The research was conducted among student-athletes attending a selective undergraduate liberal arts institution of

higher education. Although students come from throughout the United States as well as from other countries, most students are from states in the Northeast. More than one third of students arrive at this National Collegiate Athletic Association Division III school expecting to play an intercollegiate sport. No scholarships are provided for athletic participation.

All student-athletes, both in season and out of season, were asked to participate in this voluntary survey by scheduling themselves into one of the available time slots in a campus computer classroom. The scheduling options were structured so that teams were spread out and mixed across multiple time periods so that results could not be identified by team. Moreover, the survey did not ask about the student's particular sport (a fact publicized ahead of time) to help assure students and coaches that the data would not be used to identify or compare teams regarding their alcohol use or any other behaviors. This team anonymity as well as personal anonymity were devised to facilitate honest responses, greater participation, and, ultimately, a greater perception of credibility when results were reported back to student-athletes.

The survey was first administered (pretest) in November 2001. A total of 414 athletes completed the survey, representing 86% of the entire intercollegiate population. In November 2002, a second round of the student-athlete survey (first posttest) was administered to 373 student-athletes (85% response) from the entire population that academic year using the same procedures. The final round (second posttest) was conducted in November 2003, with 353 respondents (79% response). All 20 intercollegiate sport teams representing this institution participated in the survey each year. Although there was some fluctuation in roster sizes as well as survey participation rates for teams each year, a comparison of pretest/posttest numbers of respondents demonstrated no significant association overall with team affiliation ($p > .05$, chi-square test, 19 df). (Although, as noted above, the survey was anonymous and did not include any question identifying the respondent's sport, student-athletes noted their participation on arrival at the survey sessions by checking off their names with team affiliation on the sign-up rosters used for initial scheduling of the survey sessions. Thus, team participation rates could be determined independent of the survey.) Consistently high response rates each year provide strong confidence in the survey results, as does the fact that the data were gathered from a population census, not a sample. Given the high response from this population census, the significance tests of sample results presented in this study are extremely conservative. Statistically significant results are more indicative of the relative importance of the differences and impact rather than simply the likelihood that they exist in the population.

Intervention

The starting point of this social norms intervention with student-athletes was the amassing of credible facts and figures about actual student-athlete norms. More than 200 facts about student-athletes at this school were extracted and produced from pre-existing databases as well as from the Fall 2001 survey of student-athletes. Although the intervention sought to provide student-athletes with actual data on a wide range of topics concerning the academic and social lives of peers, providing information about actual alcohol use norms was a primary and prominent emphasis among the range of messages created. Examples of key databased messages about alcohol included the following facts: (1) "The majority (66%) of [this school's] student-athletes drink alcohol once per week or less often or do not drink at all"; (2) "88% of student-athletes at [this school] believe one should never drink to an intoxicating level that interferes with academics or other responsibilities"; (3) "The majority of athletes (71%) do not use alcohol to relieve academic pressures"; (4) "82% of [this school's] student-athletes never injure themselves or others as a result of alcohol consumption during the academic year"; and (5) "89% of athletes at [this school] never miss or perform poorly in athletic events as a result of drinking during the academic year."

A variety of intervention techniques promoted the information about student-athletes:

(1) Print messages were delivered in campus newspaper advertisements.

(2) Larger color-print versions of these messages were displayed as posters in cabinets throughout campus and rotated on a regular basis to achieve maximum exposure during the 2-year intervention period following the first survey.

(3) Electronic mail messages reporting these brief normative facts about alcohol as well as other facts about student-athlete activities and interests titled "MVP E-Bits" were sent to all student-athletes. MVP E-Bits were delivered approximately weekly during the school terms.

(4) Computers were set up in kiosks in the athletic facilities throughout the campus for use and viewing of program information by everyone in high traffic areas. A screensaver promoting student-athlete facts was launched on these computers. The screensaver randomly displayed all the facts and graphic posters created during the intervention period whenever the computers were not in use. They could be viewed, for example, when student-athletes were exercising in the workout rooms where kiosks were installed.

(5) An interactive multimedia program allowed users to scroll through the print media and additional facts, display video commentary of student-athlete peer educators and staff, and compete in quiz contests about student-athlete facts provided by the program.

(6) Student-athlete peer educators were trained to deliver programs to student-athlete teams that provided accurate social norm messages about student-athlete alcohol use.

(7) An interactive CD containing all sports schedules, highlights of sports news reports, a poster show of all social norms campaign posters, and coaches' pictures, biographies, and video introductions was distributed to each student-athlete in the fall of 2002 and 2003 for use in their personal computers. While navigating the CD, the user was also exposed to rotating graphic messages about actual norms drawn from the student-athlete databases.

Instrument and measures

An anonymous Web-based survey was designed specifically to gather information about student-athletes on a wide range of student-athlete characteristics including academics, social and leisure activities, friendship patterns, career interests, and many aspects of health and well-being including alcohol use and perceived peers' norms. A protocol was adopted to ensure the anonymity of subjects participating in this voluntary survey. Student-athletes signed up to take the survey in 30-minute time blocks. A group of student-athletes would simultaneously complete the survey using the same URL and password publicly given to them as a group in a campus classroom equipped with computers. Besides ensuring anonymity, this procedure prevented anyone from taking the survey again later and possibly submitting multiple erroneous responses, because the passwords were exclusive to the time period for taking the survey.

In addition to providing a wide range of information about student-athletes included in the intervention campaign, the survey asked several questions of specific interest for evaluating the intervention's impact on alcohol misuse. Respondents were asked to indicate how often they typically consumed alcohol (including beer, wine, wine coolers, distilled spirits, and mixed drinks) using categories of never, once or twice per year, once a month, twice a month, once a week, twice a week, and daily. For perceived norms, they were also asked how often they thought their friends, other students on their team, male and female athletes at their school, and nonathletes at their school consumed alcohol using the same response categories.

Regarding the quantity of alcohol personally consumed, respondents were asked how many alcoholic drinks, on average, they consumed at parties and bars (defining a drink as a bottle of beer, a glass of wine, a wine cooler, a shot of distilled spirits, or a mixed drink). Respondents entered either "none" or a specific number they estimated as their average. They were also asked to indicate the number of hours typically spent drinking the amount they specified usually consuming at parties and bars. Thus, in addition to the number of drinks typically consumed in social occasions, an estimated peak blood alcohol concentration (BAC)

in percent was calculated, relying on the respondent's reported number of drinks, number of hours consuming those drinks, and gender and weight, which were also recorded in the survey. We applied a standard formula for estimating maximum BAC, which incorporates the average amount of alcohol by volume in a typical drink, the average proportion of water in the bloodstream, average differences in fat-to-water ratios between men and women, and the average metabolism rate for the dissipation of alcohol in the blood (National Highway Traffic Safety Administration, 1994). Further refinement to this calculation was made possible by the inclusion of data from an additional question in the survey asking about the total number of drinks consumed in the last 2 weeks. This measure was used to extrapolate the respondents' total drinks per month. On average, heavier drinkers (those who typically drink 60 or more drinks per month) metabolize alcohol at a somewhat faster rate, and the BAC calculation for these drinkers can be adjusted slightly to take that fact into account (National Highway Traffic Safety Administration, 1994).

For perceived norms regarding quantities consumed at parties and bars, we used respondents' estimates of the number of drinks typically consumed by friends, by students on their team, and by nonathletes.

The composite measure of negative consequences of alcohol misuse was created based on responses to a list of 15 potential consequences of personal drinking: (1) injury to self; (2) injury to others; (3) fighting; (4) property damage; (5) cutting class; (6) inefficiency in homework, classroom, or lab work; (7) late papers, missed exams, or failure to study for exams; (8) damaged relationships; (9) memory failure; (10) impaired driving; (11) rode with impaired driver; (12) attempted intimate contact not desired by another; (13) was sexually active when otherwise might not have been; (14) engaged in unprotected sex; and (15) missed or performed poorly in an athletic event. Survey respondents were asked to indicate if any of these consequences had occurred once or multiple times as a result of their drinking during the term. A negative consequence index was scored, with one point added for each single consequence noted and two points added for each consequence noted as occurring more than once.

Respondents also were asked to indicate their class year and which years they participated in intercollegiate athletics, allowing for the determination of whether the respondent was new to the intercollegiate athletic program that year or had participated previous years. They were also asked how many of their five best friends participated in intercollegiate athletics at the same school. This measure provided an assessment of the extent to which perception of friends was also a perception of student-athlete peers.

All of the measures described above were repeated each year of the survey. In the post-intervention years (2002 and 2003), one additional set of questions about exposure to

the project initiatives communicating student-athlete facts was added to the end of the survey. Specifically, respondents were asked how often they had read, seen, used, or participated in each of the seven types of communication used to promote student-athlete facts (described previously in the *Intervention* section). They could respond to each category as follows: never, once, twice, three times, or four or more times. An index of overall exposure was created by adding the number of exposures to each venue (scored as 0 through 4 for never to 4 or more times) into a composite score.

Results

Baseline misperceptions

As predicted by social norms theory, pervasive misperceptions of the peer norm among student-athletes were found in the 2001 baseline or pre-intervention survey. When asked how often they consumed alcohol, the median response of these student-athletes was once a week, consistent for both men and women. When asked how often they thought male athletes at this school most typically consumed alcohol using the same response categories, only 22% correctly identified "once a week" as the norm. A small group, just 7%, underestimated the normative frequency of consumption, choosing a category of less often than once a week. In contrast, 71% of respondents misperceived the norm to be more than once a week. Similarly, although 38% of respondents correctly estimated how often female student-athletes most typically drank and 11% underestimated the norm, fully half (51%) misperceived the norm by overestimating the typical frequency.

Furthermore, fully two thirds (69%) of respondents thought the norm among their friends was to drink more than once a week. Although we had no direct measure of the actual norm for each respondent's set of friends, we do know that one's closest friends were drawn primarily from among other student-athletes at this school. When asked how many of their five best friends also were intercollegiate athletes, the median response was four and 72% indicated the majority (three or more).

The median number of drinks reported for personal alcohol consumption at parties and bars among these student-athletes was six drinks. This actual norm for amount consumed by student-athletes in these social settings was notably higher than what had been routinely revealed as the norm for students in general (four to five drinks) in various campus-wide surveys (Perkins and Craig, 2003), thus supporting the notion that athletes may be at higher risk for alcohol abuse than other students. Again, however, these student-athletes tended to perceive even higher norms among their close peers. When respondents were asked to estimate the typical number of drinks consumed by team

members at parties and bars, the median response was seven drinks; 31% believed the norm among teammates was to drink 10 or more drinks. When asked the same question about close friends (most of whom were also intercollegiate athletes), they provided a median estimate of eight drinks.

Pre/post intervention comparison

The survey data collected on student-athletes in the Fall 2001 administration of the survey served as the baseline for our initial pretest/posttest comparison. The survey data collected in both post-intervention years of this study (Fall 2002 and Fall 2003) were combined to provide the posttest result. Data for the posttest years were aggregated rather than analyzed as separate posttest populations receiving 1 and 2 years of intervention, respectively, because the turnover was quite high among student-athletes each year in this Division III population. Some players get cut from the team as more competitive players arrive on campus. Some drop out of athletics because of declining interest or academic problems. About one quarter of all upper-class student-athletes at this institution leave campus for at least one term on "a term abroad" program, most frequently during the fall term. Some student-athletes return after a year's hiatus or only make the team for the first time after a year or two in attendance at this institution.

Therefore, most of the returning student-athletes responding to the Fall 2003 survey would have been a participant in the athletics program no longer than the current term plus the previous academic year and thus would have had no more intervention time exposure than returning student-athletes taking the Fall 2002 post-intervention survey. Moreover, the disproportionately large number of student-athletes who were first-year entering students each year at this institution in Fall 2002 and Fall 2003 only could have been exposed to the intervention for the same length of time.

Although 2002 and 2003 respondents were grouped together as a post-intervention sample to be compared with the 2001 pre-intervention sample for the reasons cited above, returning or "ongoing" student-athletes (those who indicated on the survey that they had participated in the athletic program during the previous year) within these samples were analyzed separately from other student-athletes (first-year entering students and sophomore through senior student-athletes who had not participated in the athletic program in the prior year). The latter group in the 2002 and 2003 surveys had been participants in the athletic program for only 2 months of the intervention period (the first 2 months of the academic year in Fall 2002 or Fall 2003) and thus had received very limited exposure time to the program compared with returning student-athletes, all of whom had received more than 1 year of program exposure.

Perceived norms. To assess changes in perceived norms in accordance with program messages, we examined the

pre/post odds of a respondent perceiving more frequent consumption than the overall norm. We also examined the pre/post odds that respondents would believe it was normative for peers to drink 10 or more drinks per occasion at parties and bars, a highly problematic drinking level that would be a gross misperception of what was normative in virtually all peer subgroups. Using logistic regression procedures, the odds ratios (ORs) of perceiving these exaggerated peer norms were computed comparing the pre-intervention (2001) responses of student-athletes with the post-intervention responses (combining 2002 and 2003). These pre/post intervention ORs were computed separately for new and ongoing student-athletes, because it was predicted that a post-intervention impact would most likely be the result among ongoing intercollegiate athletes who would have experienced the post-intervention environment for more than 1 year. In contrast, students new to the athletic program with only 2 months of intervention experience in the post-intervention period had far less opportunity for misperceptions to have been reduced. In both subgroup analyses, the logistic regressions controlled for class year and gender effects to remove any confounding effect of demographic variation in the student-athlete population from year to year.

The resulting pre/post ORs reported in Table 1 demonstrated no statistically significant reductions in pre/post intervention misperceptions for new student-athletes at each time point. As predicted, substantial declines were observed,

however, during the post-intervention period among ongoing student-athletes. Perceptions that the norm for team members was to drink more than once per week were cut almost in half (OR = 0.55). Misperception that the norm is to drink more than once per week among male student-athletes at the school was reduced by 31% (OR = 0.69). The perception that friends typically drink more than once per week and that they typically drink 10 or more drinks at parties and social occasions was likewise significantly lower in the post-intervention period. These significant changes in perceptions among ongoing student-athletes were not simply reflecting a generalized change in perceptions about students on campus. Perceptions about the norms regarding frequency and quantity among nonathlete peers did not decline at all (OR > 1.00).

Personal misuse of alcohol. Seeing that substantial reductions in misperceived norms had been achieved among the post-intervention respondents who had been participants in the intercollegiate program for more than 1 year, the next question concerned whether these changes were accompanied by reductions in personal risky drinking behavior. We examined a range of drinking risk and misuse measures in this student-athlete population as follows: (1) drinking more than once per week, (2) an estimated peak BAC level of .08% or higher for drinking at parties and bars, (3) personally consuming 10 or more drinks as a typical pattern at parties and bars, (4) frequent negative

TABLE 1. ORs for pre/post social norms intervention^a predicting perceived peer norms and personal alcohol misuse for new ($n = 626$) and ongoing ($n = 489$) student-athletes^b (logistic regressions controlling for class year and gender)

| Dependent variables | New student-athletes pre/post OR | Ongoing student-athletes pre/post OR |
|---|----------------------------------|--------------------------------------|
| Misperceptions of peer student-athlete drinking norms | | |
| Perceived >1 time/week alcohol consumption among teammates | 0.83 | 0.55 [†] |
| Perceived >1 time/week alcohol consumption among male athletes | 0.81 | 0.69* |
| Perceived >1 time/week alcohol consumption among female athletes | 1.05 | 0.84 |
| Perceived >1 time/week alcohol consumption among friends | 0.96 | 0.60 [†] |
| Perceived ≥ 10 drinks as typical at parties and bars among teammates | 0.93 | 0.79 |
| Perceived ≥ 10 drinks as typical at parties and bars among friends | 0.87 | 0.58 [†] |
| Misperceptions of peer nonathlete drinking norms | | |
| Perceived >1 time/week alcohol consumption among nonathletes | 0.68 | 1.02 |
| Perceived ≥ 10 drinks as typical at parties and bars among nonathletes | 0.88 | 1.12 |
| Personal drinking measures | | |
| Consumed alcohol >1 time/week | 0.85 | 0.54 [‡] |
| Peak estimated BAC $\geq .08\%$ at parties and bars | 1.00 | 0.70* |
| Consumed ≥ 10 drinks at parties and bars | 0.86 | 0.61* |
| Frequent consequences during term (scored ≥ 4 on consequence index) | 0.88 | 0.66* |
| Extreme problem drinking (scored ≥ 8 on consequence index) | 1.17 | 0.61* |

Notes: ORs = odds ratios; BAC = blood alcohol concentration. ^a2001 survey represented pre-intervention baseline and combined 2002/2003 surveys provided post-intervention results; ^b"new" student-athletes included all first year students and upper-class students who had not participated in intercollegiate athletics the previous academic year.

*Statistically significant pre/post difference in predicted direction at $p < .05$; [†] $p < .01$; [‡] $p < .001$.

consequences of drinking (scoring 4 or higher on the consequences index), and (5) extreme problem drinking (scoring 8 or higher on the consequences index).

Table 1 also presents a pre/post-intervention comparison of personal drinking risk and misuse, again separately for new and ongoing student-athletes based on ORs from logistic regression analyses. There were no significant pre/post differences among new student-athletes. As expected by the intended effect of the intervention and by the observed changes in misperceptions in Table 1, marked declines in personal risky drinking behaviors were observed, however, for ongoing student-athletes surveyed based on the ORs comparing the pre/post-intervention samples. The chance of personally drinking twice per week or more often was cut almost in half (OR = 0.54), having an estimated peak BAC level of .08% or higher based on typical drinking at parties and bars was 30% less likely in the post-intervention group, the likelihood of consuming 10 or more drinks at parties or bars was cut by more than one third (OR = 0.61), and the likelihood of experiencing frequent negative consequences of drinking was cut by one third (OR = 0.66).

Program exposure levels and predicted effects on perceptions and behavior

The common question arising in pre/post experiments that do not have a control sample for comparison is whether some other phenomenon might have occurred during the time period to produce the changes in perceptions and behaviors observed among these student-athletes. As already noted, the differences in perceptions about peer student-athletes did not carry over to perceptions of nonathletes. Moreover, the pre/post intervention differences in perceptions of athlete peer norms were most notable for ongoing student-athletes. Similar differences should have been the result for the category of new student-athletes as well if a more general campus change were occurring. Thus, it does not appear likely that some other phenomenon was generally producing the changes observed in 2002 and 2003 for ongoing student-athletes. Nevertheless, we conducted further analyses to test the link between the program intervention and respondents' perceptions and behaviors based on the degree of program exposure as recalled by student-athletes in the post-intervention time period.

A large majority of respondents had seen a wall poster (85%) or had read a computer screen saver fact (80%). At least half had read a program fact in the campus newspaper (62%), read an email "E-bit" message (54%), or used the interactive multimedia program (50%). More than one third had used the CD at least once (36%) and 40% had attended a workshop. (Workshops were conducted in the late fall and spring terms, so new student-athletes would not have had the opportunity yet to participate in this venue.)

Responses on each exposure to each of the seven venues were initially recorded in five categories (never, once, twice, three times, and four or more times, coded 0 to 4). Scores on each item were added to create a composite measure. Observed scores ranged from 0 (no exposure) to 28 (maximum exposure possible on the index). The lowest decile on the exposure index (about 1 of 10 respondents) scored 0 or 1, representing no exposure or recall of only one exposure to the program considering all venues. This group was categorized as low exposure for subsequent analyses. In contrast, the highest decile of respondents, subsequently categorized as high-level exposure, scored 19 or higher on the index. As expected, ongoing student-athletes (those students participating in intercollegiate athletics during the previous year) were twice as likely as new student-athletes to indicate this high level of exposure (14.4% compared with 7.2%, respectively, $p < .01$).

Perceived norms. ORs for perceiving exaggerated peer norms were computed again using logistic regression, this time for contrasting exposure levels among respondents in the post-intervention period. Student-athletes who reported very low exposure were compared with those with moderate exposure (scores of 2 to 18 on the exposure index) and very high exposure controlling for class year and gender. These ORs are reported in Table 2. Here the odds of perceiving the drinking norm among teammates as more than once per week are significantly less with moderate exposure compared with low exposure (0.66). Likewise, the predicted chance of misperceiving the teammate norm to be 10 or more drinks at parties and bars is cut by more than one third (OR = 0.63) when comparing low with moderate exposure. The predicted effects are most notable, however, when contrasting the low- to high-exposure categories. The chances of perceiving the drinking norm to be more than once per week among teammates and among male athletes in general drop dramatically (OR = 0.37 and 0.34, respectively). Also, misperceiving that teammates and friends typically drink 10 or more drinks at parties and social occasions was significantly less likely among the student-athletes with high exposure. Again as predicted, this pattern of lower misperceptions with higher exposure was not the result when considering perceptions of the norms for students in general, perceptions that were not the subject of the intervention messages.

Personal misuse of alcohol. The same logistic regression analysis controlling for gender and class year was used with the 2002-2003 data to estimate ORs for personal drinking risks (also in Table 2). The resulting odds of personal risk and misuse are lower for midlevel program exposure compared with low exposure in the predicted direction on four of the five measures. Three ORs achieve marginal significance ($p < .10$). The predicted chances of consuming alcohol more than once per week, consuming 10 or more drinks at parties and bars, and exhibiting extreme problem

TABLE 2. ORs for social norms intervention exposure level^a predicting perceived peer norms and personal alcohol misuse among student-athletes during the post-intervention period^b (logistic regressions controlling for class year and gender, $n = 726$)

| Dependent variables | Low/mid exposure ^a OR | Low/high exposure ^a OR |
|---|-------------------------------------|--------------------------------------|
| Misperceptions of peer student-athlete drinking norms | | |
| Perceived >1 time/week alcohol consumption among teammates | 0.66* | 0.37 [†] |
| Perceived >1 time/week alcohol consumption among male athletes | 0.71 | 0.34 [‡] |
| Perceived >1 time/week alcohol consumption among female athletes | 1.09 | 0.79 |
| Perceived >1 time/week alcohol consumption among friends | 1.14 | 0.76 |
| Perceived ≥ 10 drinks as typical at parties and bars among teammates | 0.63* | 0.59 [§] |
| Perceived ≥ 10 drinks as typical at parties and bars among friends | 0.74 | 0.50* |
| Misperceptions of peer nonathlete drinking norms | | |
| Perceived >1 time/week alcohol consumption among nonathletes | 2.57 | 1.48 |
| Perceived ≥ 10 drinks as typical at parties and bars among nonathletes | 0.83 | 0.79 |
| Personal drinking measures | | |
| Consumed alcohol >1 time/week | 0.69 [§] | 0.40 [†] |
| Peak estimated BAC $\geq .08\%$ at parties and bars | 0.87 | 0.25 [‡] |
| Consumed ≥ 10 drinks at parties and bars | 0.70 [§] | 0.43* |
| Frequent consequences during term (scored ≥ 4 on consequence index) | 1.03 | 0.47* |
| Extreme problem drinking (scored ≥ 8 on consequence index) | 0.65 [§] | 0.21 [†] |

Notes: ORs = odds ratios; BAC = blood alcohol concentration. ^aExposure was categorized as follows: low (scores of 0 to 1), mid (scores of 2 to 18), and high (scores 19 to 28); ORs compare mid and high exposure categories to low exposure category; ^bsocial-norms intervention period combined surveys from 2002 and 2003.

*Statistically significant difference by exposure level in predicted direction at $p < .05$; [†] $p < .01$; [‡] $p < .001$; [§] $p < .10$ (marginal significance).

drinking (scoring 8 or more on the consequence scale) were all cut by at least 30% with moderate exposure. Although the number of items here achieving statistical significance and the level of significance are low, it is important to reiterate the point made earlier that the significance tests are extremely conservative indicators of a relationship, given that the data more closely represent a census of the student-athlete population than a sample that could vary widely from the actual population result.

Most notable, however, are the predicted ORs comparing high- with low-level exposure. Here the predicted effect of a large dose of exposure compared with little or none is dramatic and statistically significant on each item. The predicted chances of consuming alcohol more than once per week, consuming 10 or more drinks at parties and bars, and experiencing frequent negative consequences from drinking are all cut by more than half (ORs = 0.40, 0.43, and 0.47, respectively). The predicted likelihood of typically reaching an estimated BAC level of .08% or higher when drinking at parties and bars and extreme problem drinking were reduced by at least three quarters (ORs = 0.25 and 0.21, respectively).

Discussion

The higher-risk status of student-athletes for alcohol misuse suggests that greater attention must be given to this subpopulation of college students. This subpopulation can

represent a sizable proportion of the student body at small colleges. Moreover, at both large and small schools, student-athletes' high-profile status as role models is an additional reason for concern about the need to address drinking problems in this group. As is generally the case in research on student drinking, the student-athletes in this study frequently misperceived the norms among student-athlete peers in an exaggerated direction. When exposed to frequent messages about actual peer norms based on credible local data, however, the student-athletes exhibited significantly less risk of misperceiving the norms and less risk of alcohol misuse. Our results clearly support the potential benefit of introducing a social norms intervention with student-athletes at undergraduate colleges where this subpopulation represents a sizable proportion of the student body (as is the case for many National Collegiate Athletic Association Division III institutions). More research is needed to assess the effectiveness of this strategy at larger Division I institutions, where the student-athlete population is proportionately much smaller relative to the total student population. Furthermore, as higher education professionals pay greater attention to the implementation of policies designed with the intention to increase responsible behavior among their student-athletes, researchers might investigate the potential benefit of mandating normative feedback about actual peer athlete attitudes and drinking behavior in required programs for policy offenders and in required general orientation programs for student-athletes.

We acknowledge limitations in this study. First, the survey data are based on self-reports and are thus subject to the various kinds of error associated with this approach. Nevertheless, a review of the literature reveals that self-report survey data are generally reliable and valid (Babor et al., 2000; Cooper et al., 1981; Midanik, 1988), especially if the data are collected anonymously as was the case here. Second, the study could not provide an experimental design using a randomized matched control group of unexposed student-athletes to compare with student-athletes exposed to the intervention. Precisely because the intervention strategy was intended to intensively and widely broadcast actual norms to student-athletes, we could not randomly isolate a matched set of subjects. Nevertheless, this study does provide for multiple controlled comparisons, strengthening the validity of results. First, pre/post intervention data were collected at the same time each year with exactly the same methodology. Within this pre/post comparison, new student-athletes were compared across time separately from ongoing student-athletes. The new student-athletes provided a quasi-control for any environmental changes that might have occurred apart from the intensive program intervention. They demonstrated no change over time. Second, the measures of all respondents' perceptions of nonathletes also demonstrated no change over time. Third, the cross-sectional analyses of the association between lower risk and increasing exposure provided further support for linking the reduced risk observed over time to the program intervention.

Several factors may be key in the success of this intervention. The high degree of student-athlete participation in data collection providing credibility, the reporting of actual positive norms without scare tactics and admonishing messages, and the pervasive promotion of accurate norms through multiple venues across the entire academic year in each year of the intervention were all potentially important elements of this experimental intervention.

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